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The Farmer's Digest

Volume 12 December, 1948 Number 7

They Call It "Balanced Farming"

Condensed from The Nation's Agriculture

Herbert W. Hall

THERE are many routes to the goals sought by farmers and farm organizations—the goals of better farming, social and economic welfare, higher rural living standards. In Missouri, they have found one of the most direct ones. They call it "balanced farming."

Balanced farming is not a new principle. It is an intense application of an old and basic one. It involves individual farm planning, use of the best management practices, conservation, and efficiency. Balanced farming aims at higher farm income, but it does not stop there. The planning includes, and emphasizes, the use of the higher income in a way to get the fullest possible satisfaction in the form of better family living.

The "balance" in the program applies not only to the wise use of soil, livestock and other production resources, but also to the well rounded enjoyment of rural life. A balanced farming plan takes in the farm home along with the crops and livestock. It calls for the best conditions for raising pigs, and it also aims at the best environment for rearing children.

Fundamentally, balanced farming differs little if at all from the regular Extension program. Its objectives are the same, but it provides a quicker, surer way of reaching them. A farmer who adopts a balanced farming program applies practices recommended by the Extension Service to his farm more rapidly and more effectively.

At the outset, he analyzes his present farming system and determines its weaknesses. He does this with the aid of his county agent, and with work books and other materials supplied by the county agent's office, he plans a revised farm layout and cropping system. Livestock enterprises for the re-

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vised system are determined. Details of the new cropping program are worked out and decisions are made on soil treatment and other practices. A livestock management calendar and a revised farmstead layout map are prepared.

At the same time, a family plan is developed. This includes food needs and production; clothing requirements; rearrangement of the house for more efficient and pleasant living, and a family budget including education, medical care, recreation, church and community activities.

The improvements needed for both farm and home are summarized, and costs are estimated. Naturally, the improvements are not all put into effect immediately. Rapid cash outlay is discouraged. The purpose is to let the program on each farm produce enough extra income as it goes along to finance the desired improvements. That this actually takes place has been amply demonstrated. Better farm practices produce more net income.

Here are some examples cited by the University of Missouri College of Agriculture. Ten families who adopted farming plans produced 77 per cent more beef, 121 per cent more pork, 50 per cent more lamb, 95 per cent more butterfat and 19 per cent more eggs. This was done on the same number of acres and with no increase in workers. Records from 169 balanced farm demonstrators show acre increases of about 12 bushels of corn, 12 bushels of oats, nine bushels of wheat, a ton and a half of hay. These same farmers developed 73 per cent more permanent pasture.

The Extension Service in Missouri has been promoting balanced farming for over 12 years, but in the last three the program has been stepped up by the formation of balanced farming associations. Each of these associations, made up of 50 farmers, has the exclusive service of an associate county agent who helps the members develop their plans and carry them through. The associate county agent furnishes the equivalent of a general farm management service for the 50 farms in his association. He advises on farm practices, helps keep financial records, and supervises the progress of the balanced farming plan for each farm.

The first of these associations was organized in Carroll County in 1945. Since then about 35 more have come into being. In each county the balanced farming association is originally authorized and approved by the farm organization that sponsors Extension work (often the Farm Bureau).

The cost of the association is $100 a year for each of the 50 farm families. In most cases the farmer pays a fee of $50. The Extension Service contributes $25,

and local businessmen $25. The money is used to pay the salary and expenses of the associate county agent who is recommended by the Missouri Agricultural Extension Service. His appointment is approved by the Farm Bureau (or other organization sponsoring Extension work) and by a committee elected by the 50 members of the balanced farming association.

In the counties where these associations operate distinct progress can be seen. Soil conservation, basic to any permanent farming system, is receiving much attention. Missouri soils, very susceptible to water erosion, are being protected by scientific water management systems. Terraces and well-laid-out waterways are among the outward marks of farms with balanced farming plans. Ample fertilizer use, lime application, and cropping systems that keep the land in legumes a part of every year result in outstanding farms.

By planning their operations according to the best practices, with definite goals in mind, many Missouri farmers are increasing their incomes, raising the value of their farms, and making it possible for their families to lead a more satisfying rural life.

Sawdust Isn't Good Humus

It is not a good idea to put sawdust directly on the soil for a mulch or to make humus, advises C. J. Chapman, extension soils man in Wisconsin. The fungi and bacteria that grow in rotting wood feed on nitrogen in the soil and take it away from crops that need it. After the organisms die the nitrogen they have used again becomes available to other plants, but by that time it is probably too late to do the crop much good.

Dairymen around lumber mills sometimes like to use sawdust and shavings for bedding because they absorb so much liquid. Use of moderate amounts in the gutters is satisfactory, Chapman says, because there is probably enough nitrogen in the manure liquids for both the field crop and the fungi that will develop in the rotting wood fiber.

—Cappers Farmer

Birdsfoot Trefoil

Condensed from the American Agriculturist

A. James Hall

ONE day early in August, I spent 12 hours following the heels of Ray Bender, county agent, over and under fences, up and down hills, through woods and across rolling pastures to look at birdsfoot trefoil and talk to farmers who grow it in Essex County, New York.

I was in at least 25 or 30 different fields on almost as many farms and I talked to a dozen farmers who grow this legume that is so widely discussed.

Without exception, every man I talked to was positively enthusiastic about birdsfoot. Fully half of them are seeding this legume to all their hayland and pastures as fast as feasible.

Most of the farmers we talked to were farming heavy Vergennes clay and, from what I saw and learned, clay is the type of soil that shows off birdsfoot to its best advantage. It's not the crop to grow if you are on a rotation plan that calls for plowing up a field every few years, and even Bender —who is so enthusiastic about the crop that he's commonly called 'Birdsfoot' Bender—will admit that there are other legumes better for light soils.

Growing birdsfoot is beyond the test-plot stage in Essex County. There are more than 2,000 acres of it with more going in every year. On the Richard Sherman farm at Westport, we stood in the middle of one field of 200 acres of trefoil that he's growing for seed. He has about 100 acres on another farm for pasture, hay and more seed. Here I saw birdsfoot growing lush and green on clay pasture land that was cracked wide open and hard as rock after a 3-weeks' drought. His herd of Guernseys was about as fat and sleek as any I have ever seen, giving ample proof of their fondness for the legume.

Wallace Johnson and his brother Lyle of Ft. Ticonderoga operate a 700-acre farm with 100 acres in apples and the balance in dairy crops. Wallace, whose chief concern is the herd of 65 to 70 pure-bred Holsteins, told me that birdsfoot trefoil and grass silage answer the prayer for efficiency on a combination apple dairy farm.

Until 10 years ago the John-

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September 18, 1948

sons used alfalfa for the legume in their hayland. "We found it like apples," Wallace said. "When it gets to a certain stage, it has to be harvested. We found, also that it would be gone in two or three years. So, on a 3-acre piece, we tried some broadleaf birdsfoot seed that Ray Bender brought in from Albany County."

The trial was so successful that it's only a matter of time until their entire farm will be in trefoil. They've never had a seeding failure. Seed for the 250 acres they now have came from the 3-acre block. They've sold seed from it, too—seed that's bringing $2.50 a pound this year!

"Now," said Wallace, "we can do our haying just about when we want to." This is one of the chief advantages of birdsfoot according to every man I saw. "Birdsfoot starts slow in the spring," Wallace continued, "so we don't have to hay it in rainy June. We can do it in late July or even into August and pick our own weather. Birdsfoot will stay green and the fine stems tender until October if one wants to wait that long."

The birdsfoot program works especially well for the Johnsons. They make grass instead of corn silage to avoid silo filling at the same time they are harvesting apples. Due to the long life of birdsfoot and with no need for a corn-grass rotation, there'll be mighty little plowing done on their place once they get it all in trefoil.

The reason some men get discouraged with trefoil was well illustrated at the Dennis Wells farm at Essex. He showed me a 12-acre piece seeded without a nurse crop this spring. I had to look close to find one or two plants per square yard. Ray said that one big mistake which has given birdsfoot the reputation of being a hard starter is that too many men don't know what to look for or, when they do find a few shoots, feel the crop is a failure and plow it up. More often than not, it is still a thin stand the second year and it is wise to let the seed pods shatter before pasturing or mowing it. But watch it from then on!

Dennis then took us to a field seeded in 1946. It, too, had been sparse. This year, though it had been pastured from May 10 to June 1, it was a mass of birdsfoot 26 inches high from one fence to the other. He moved the cows out June 1 because he wanted to harvest the seed. After threshing, the "straw" will go in his hay mow to make, according to Dennis, "Some of the best hay my Jerseys ever had."

Others disagree with Dennis' idea of using birdsfoot for hay after it has been threshed, claiming that too many leaves are lost. Most men use it for bedding. Dennis has been growing birdsfoot since 1942. He has 70 acres and

eventually will have his whole 150 acres of tillable land seeded to trefoil-timothy, or trefoil-brome grass.

Ray has thought for some time that because it is late maturing, timothy is the best grass to sow with birdsfoot. He recommends 5 pounds of broadleaf birdsfoot and 4 to 6 pounds of timothy to the acre. However, after seeing wonderful results obtained by John Gough and Walt Smith, both of Westport, he's beginning to think that brome grass might be an even better companion crop. The trefoil does well when seeded alone but lodges badly when there is no grass to help hold up the tender young stems.

Although Wallace Johnson threshed 200 pounds of seed to the acre off his old three-acre patch one year, you can expect only 75 to 80 pounds per acre, and then only if you are lucky. Since birdsfoot seed pods ripen throughout the summer, it is tricky to decide just when the most seed is ready. You have to mow and windrow and then combine it. If you should get a rain, or if a real dry wind puffs across the field, your yield can drop right down to nothing.

Earl R. Frisbie was busy with a hay baling crew when we reached his place a few miles out of Westport. The hay down was part alfalfa and part birdsfoot, which gave him a good chance to show me that birdsfoot, because of its tender, thin stems, cures much faster than the tougher stemmed alfalfa. Earl has 83 acres of birdsfoot now and sows more in oats each year.

"With trefoil," he stated, "I can wait until the weather is right and then do my haying in a week. It used to drag out for several weeks. Trefoil stays green so long that last year, on Sept. 20, when I ran short of corn for my silos, I finished filling with birdsfoot after it had been combined for seed. I think the cows liked it better than the poor corn silage at that."

Birdsfoot is seldom more than 26 to 28 inches tall. It grows in such a profuse mass, once it has a good start, that it affords good summer pasture on land that for years past supported little more than goldenrod or chicory. Earl's brother, Robert Frisbie, pastured 28 head of Holsteins all summer on a 13-acre piece. On Aug. 4, it was still in good enough shape so that he laid plans to harvest seed this year.

Birdsfoot is said to have arrived in this country from Europe in the last century, traveling over here in ships' ballast that was dumped along the shores of the Hudson. However, it wasn't until the 1930's that Albany County farmers began developing the legume that grew "wild" in their fields. It got its real start in 1936 when Albany farmers organized the Eastern New York Birdsfoot Trefoil Grow-

ers' Cooperative for the distribution of seed.

Ray Bender had been interested in birdsfoot for some time before he went down to Preston Hollow in 1938 and bought seed for trial in Essex County. That year he had five farmers try it in small plots.

Ten years of watching, developing and promoting his favorite crop has led Bender to believe that in broadleaf trefoil he has the best answer to improving pasture and hayland.

The New York State Seed Improvement Association this year adopted the name Empire Lotus for the New York broadleaf trefoil. The new name is designed to avoid confusion with the narrowleaf trefoil which is prolific along the Hudson and with European varieties. Many Essex and Albany men are growing certified Empire Lotus this year, carefully roguing fields to keep weed content at a minimum.

Ray advises men with heavy land or with pasture they don't want to plow every few years to try a small piece of trefoil. He claims having a field of it is like having money in the bank—you don't have to harvest it at a given time but it's there when you need it for either hay or pasture.

Drawing on his own experience and that of men with 2,000 acres of birdsfoot, Ray offers these don'ts:

Don't sow birdsfoot if you plan to rotate crops—it's too hard to establish and too low in yield the first year.

Don't sow it with a legume—the frail plants can't compete.

Don't sow it on land which has been manured during the past two years—it's apt to contain too many weed seeds. Use manure, if at all, only after it has had two summers growth.

Don't sow it on light sandy soils.

Advantages he lists for trefoil include: (1) long life; (2) drouth resistant when well established; (3) a high protein forage that grows well in summer and makes an excellent permanent midsummer feed; (4) it reaches its best hay stage later than clover or alfalfa, thus lengthening the season for making "early cut" hay; (5) it will survive with less lime than alfalfa and will grow on soil too low in fertility or too poorly drained for alfalfa.

Bender suggests for seeding: Prepare a good, fine, firm seedbed. Use superphosphate always (300 to 500 pounds of 20% to the acre) and lime if necessary. Be sure to treat the seed with the proper and fresh inoculant. Ray suggests mixing an equal amount of cornstarch with the inoculant as this feeds the bacteria while the plants are getting established.

The earlier in the spring that sowing can be done in a well prepared seed bed, the better. Sow

shallow, not more than a half inch. A cultipacker-seeder is ideal but drills that drop seed back of the discs are satisfactory, as are Cyclone or wheelbarrow seeders. Drills that drop seed in front of discs or run it down drill spouts will cover most of the seed too deep.

Since birdsfoot starts slowly, don't drown it with a heavy "nurse" crop. Oats seem to be the most satisfactory but use only 5 pecks to the acre with either straight birdsfoot or birdsfoot-grass combination. Best results are obtained when the oats are grazed off early. Some men have had good results sowing oats and combining them.

If you seed without a "nurse" crop, it is wise to clip the stand about three inches high one or more times to reduce weed competition.

When stands are established, superphosphate should be applied every three or four years, and to be sure of a permanent hay field it is wise about once every four years to let blossoms ripen before cutting.

It's better not to graze birdsfoot too closely, but I saw some fields that looked as though goats had given them a going over. Ray showed me one patch which had been grazed this way six years, but kept coming. He also showed me colored pictures of frost-heaved trefoil plainly showing their new crowns growing out of the old roots to replace the exposed growth killed by frost!

Birdsfoot trefoil can be cut but once a season, but that one cutting (best at the time of full bloom) will give two to four tons of fine stemmed leafy hay per acre. Unlike alfalfa, trefoil does not produce a second or a third crop of new shoots, but continues to grow at the end of the stems. This is why cutting can be delayed without much loss in food value.

As far as food value is concerned, chemical analysis of hay and pastures shows a feeding value very similar to alfalfa. Trefoil seems to be between the first and second cutting alfalfa in feed value. The aftermath's feed value is comparable to wild white clover.

Ray says, "If you want permanent hay land and pasture that will have a legume in it for years to come, give birdsfoot a chance. You won't get much for two years, but it's worth waiting for."

The Quest For Tenderness In Beef

Condensed from The Shorthorn World

Col. Edward N. Wentworth

Most people nominate beef as their preference, when asked what meat they would choose if only one could be obtained.

Beef was first preferred by man because of its availability. When the huntsman's arrow brought down game, he had a larger supply of meat in proportion to his effort than with the horse, sheep, goat, antelope, deer, elk or boar. Some of the primitive races in France, Belgium and Northern Italy were artistic enough to present, on the walls or ceilings of the caves in which they dwelt, paintings of the bison and the great aurochs or forest ox, in a manner that indicated their pride in acquiring such game.

Unfortunately, the easiest obtained specimens furnished the toughest meat because the heaviest, slowest, and oldest cattle could be caught quickest. Apparently primitive man liked the flavor of this beef the best, though, and developed his jaws to the stringy resilience of its fibres. As he progressed with domestication, he waited for the ox to wear out on the plow, or the milkcow to fail in the dairy, before he attempted slaughter. However, he soon discovered that aging of the carcass broke down the closeknit fibers of the muscular tissue and made the flesh more tender. Many early races developed a taste for "ripened" beef, so "high" that our modern aesthetics would force its rejection.

Man's next discovery toward improving the tenderness lay in fattening. The early part of the eighteenth century, 1720 to 1730, saw the rapid development of forage and root crops, both in Great Britain and on the European continent. As every cattleman knows, Robert Bakewell was the first to appreciate the value of these new feed-stuffs in connection with beef improvement, and his experience with Longhorns led the Colling Brothers, and others, to develop the Shorthorn breed.

The third step toward improving tenderness was unintentional. As costs of production of beef rose, it became necessary to mar-

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September 10, 1948

ket the animals at younger ages. The great bullocks at the Smithfield shows of 1800 to 1835 were four to seven years old. Up to 1810 Shorthorn cattle could not compete unless they had first been worked. In 1811 it was voted to call an animal a steer until four years old, thereafter an ox. In 1875 the minutes of the Smithfield Club show that "in the classes for the old steers and oxen of the Devon, Hereford, Shorthorn, Sussex, and Cross or Mixed, the ages shall be limited to 'not exceeding 4 years and 6 months old'." In 1878 the ages of the oldest class in the forgoing breeds were limited to "above 3 years and 6 months and not exceeding 4 years and 6 months." In 1886 separate carcass classes were established for steers and heifers "not exceeding three years old." Ten years later the maximum age for live steers and slaughter females was limited to three years also. In 1911 a motion at the annual meeting to reduce further the age of cattle exhibited was lost, and elicited the scornful comment that the Smithfield Club would be giving prizes for veal instead of beef.

At American shows we accepted younger cattle much more rapidly. In 1905 a Hereford steer that was classified by the arbitrary dating system as a senior calf won the grand championship at the International, and two years later a Shorthorn of corresponding age made the same winning. "Veal editorials" were rather common in American agricultural and livestock papers, but gradually everyone became accustomed to the idea. In fact, baby beef was just becoming known, although the majority of retailers called any well-finished young steer or heifer baby beef, whether or not it met the stockman's standard of retaining the calf fat made on its dam's milk. Around the first World War the Bureau of Markets attempted to set up a separate classification for "baby beef," but compromised on yearlings sixteen to nineteen months old which became ready for slaughter from early July into early October. Many of these were wellbred range calves that had been in the feedlot eight to eleven months, which had grown and fattened at the same time—an economical procedure when concentrate feeds were not too high priced. From 1923 to 1941 these cattle were the pride of the American beef trade, producing cuts in the weight and of the quality the house-wife desired, with a minimum of waste.

Always there remained the conservative connoisseurs who bemoaned the loss of the well-finished and ripened beef of the three- and four-year-old cattle,

and a limited number of westerners who still believe grass beef had flavorful qualities that the rapidly finished yearling could never acquire. But just as the man who liked old-fashioned Southern hickory smoked hams, or the slow-cured packer hams, had to give way to the multitude who welcomed the tenderized, artery-pumped product, so did these survivors of an earlier day fall before the public who valued steak "you could cut with your fork" more highly than cuts redolent of the mouth-watering flavors of matured beef. The combination of this desire for extreme tenderness and the lesser cost of production proved too much for the feeder of matured heavy beef, and since the First World War the market for the latter commodity has been restricted almost entirely to the hotel, club, and restaurant trade. An outlet with such rigid limits makes the feeding of heavy cattle the most speculative segment of the beef industry — highly remunerative when supply is only slightly unsatisfied and even more strongly disastrous when the supply is just barely surplus.

This latter fact increased the interest in yearling beef, and started a competition for making fine-textured beef carcasses with a minimum of waste. At the fat stock shows smaller and smaller steers won the championships from 1916 forward, and judges who awarded their purples to steers that looked like they might have been profit makers for their owners under ordinary conditions, were often condemned violently. Most of the breeders selecting for the extreme type of compact, high-quality steer, soon found themselves facing a serious problem in weight-for-age, and also in the milking qualities of the dams. While these developments were taking place, the war and post-war scarcities created a serious disparity between livestock and grain prices. During the last year the situation was very serious and the need of developing new ways of producing beef cheaply became urgent.

Two practices point to what ultimately may become a solution, if tenderness and lack of wastiness are to be preserved for the household trade. The first comes from France. For more that a half century, French cattle feeders have obtained tenderness and trimness in their beef cuts by developing their steers until three or four years old on a growing ration, but confining them for their entire lives to their stalls. This, of course, is not a practical procedure in the United States, even though the public should manifest a desire for this class of meat,

something which it has had no opportunity to do.

On the other hand there has been a growing demand over the years for what are commonly called "heavy veals." These are usually 250 to 350 pound calves from beef cows, taken from their mothers on the range just at weaning time. Such calves have met favorable reception in the family trade in the Middle West and Southwest and the demand for them is expanding. But they are an emergency product. No owner of beef cattle can visualize a regular business in slaughtering calves of good beef heredity just when they are ready to fend for themselves. Certainly, the potential profits vitiated would be tremendous.

From the luxuriant beef pastures being developed in California and the Southwest—Alabama's black belt, sections of Georgia and the midriff of Mississippi—comes a new combination of ideas that is full of promise. The product sought is a larger calf than the usual heavy veal, weighing from 450 to 600 pounds. It comes to market direct from its mother's milk, supplemented by creep-fed concentrates, and based on fertilized luxuriant pasture growth capable of producing 500 to 600 pounds of beef per acre annually, unsupplemented. The cost is relatively small, the outlet for the meat seems unlimited, and the requirements of tenderness, non-wastiness, and family size of cuts seem to be met. Of course, the beef doesn't please the conservative epicure. It is still veal to him. Nor does it suit the buyer for the hotel, club, and restaurant trade. It is not intended to! But it does fill a family trade need and can be produced on cheap feed at a cost that leaves a regular profit to the skillful manager.

What kind of cattle does this practice call for? Beefy, quick-growing, adequate milking strains are needed. The calves must be weight-makers. Their weight must be found in their muscular structure, not in frame, bone or hide. And their dams must be voracious consumers and efficient utilizers of grass and forage.

Animals of approved market size off their mother's milk are no novelty in sheep. The growth of the black-faced milk-fat lamb industry in Washington and Idaho is a well known example. Good milking white-faced ewes mated to Hampshire and Suffolk rams are producing lambs at weening of the most desirable market weights—70 to 85 pounds or heavier. If the housewife demands cuts that can be had most cheaply and easily from 500 to 600 pound live calves, she should have them. There is something that the

mother does to milk in synthesizing it from grass, which the calf cannot do for itself. Maybe it is a question of vitamins, perhaps amino-acids are involved.

One of the peculiar characteristics of the livestock situation today is that cattle, sheep and swine production continue to decline despite high price levels. Different reasons are advanced—the high cost of feed, the fear of a depression and sudden price break, and the danger of stockmen falling into the hands of bankers as occurred in 1921. The advantage of producing these heavy beef calves under such conditions becomes obvious. Under this system, there is no inventory of yearling and two-year-old steers on which to take a loss, the depreciation in value of commercial breeding cows is less than in marketable animals, the annual clean-up permits a relatively smaller amount of invested capital to be carried over from one year to the other, and the labor investment, always high in heavily fed cattle, is at a minimum. The quest for tenderness along these lines has many economic advantages.

McLemore-Inventor

Condensed from the Acco Press

Bill Tipton

Most of us have had ideas suggested by something we've read in an easy chair at home. But few of us have ever done much about them. This is the story of a man who did. His name is Price C. McLemore, and because he did something about an idea he had, today's farmer has the flame cultivator.

Mr. McLemore is a native of Alabama—his folks came there in 1814, five years before Alabama was made a state. He lives at "The Oaks" in Waugh, Alabama, was graduated from the University of Alabama in 1930, and from the Infantry School at Fort Benning, Ga. In the winter of 1933 he held a reserve commission as a captain in the Tank Corps of the Army.

On this winter day of 1933, he was sitting in the living room of his home, reading the rotogravure section of the *New York Times*. As a reserve officer, he was very

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much interested in a picture of an Italian tank in this paper, a tank with a flame thrower attachment on the front of it, something entirely new at that time. He finished reading the paper and threw it away, but his subconscious mind kept turning over the idea of this tank with the flame thrower, and almost unconsciously he kept wondering if it couldn't be used for something else. About a month later, the idea buzzed again. McLemore tried to find the paper in which he had seen the picture of the tank with the flame thrower, but he couldn't find it, and so he went out to the tool shed, got a blow torch, and began to experiment. It turned out to be a matter of adapting the basic idea and refining it, for his experiment worked from the very first.

In 1938, after long tinkering with various hand models, Price McLemore produced 25 acres of cotton on his place without hand labor for hoeing and weeding. In 1939, he produced 125 acres of cotton and 50 acres of corn in the same manner. It was all trial and error, with no past experience to go on.

After 1938, Mr. McLemore knew that he had something revolutionary for agriculture. He took out basic patents on his flame thrower-turned-agricultural-tool. Today, he holds 15 patents on it. While he holds the patents and receives royalties on its manufacture, Price McLemore is much more interested in seeing the tool mass produced and the cost come down than in pocketing royalties. He got together with Atherton Richards who became interested in the new tool because of its possibilities for use in the Hawaiian pineapple fields. Mr. Richards, now president of Flame Cultivation, Inc., holds the license to manufacture under agreement with Price McLemore. New Holland Machine Co. is a licensed production line manufacturer.

In 1941, McLemore sent a model of his flame cultivator to Dr. J. E. Adams, then at Stoneville, Mississippi (now head of the combined Agronomy Department of Texas A. & M. College, the Texas Agricultural Experiment Station, and the Texas Extension Service). Field experiments and refinements of the burner followed with the help of the Stoneville group. Dr. Barr of Louisiana State University and three Louisiana sugar cane growers came to Alabama, saw field demonstrations, and proceeded to make adaptations of the burner to make it work as an agricultural tool in the sugar cane fields.

With the entry of the United States into World War II, Price McLemore was called to active duty, not in the Tank Corps, but in the Air Corps Training Command. He served four-and-a-half years, came out a colonel.

While in the service, Mr. McLemore bought his present 2000-acre place, "The Oaks." He had been reared on a farm nearby, had seen this place go downhill as a typical example of absentee ownership, grow up in weeds and bushes. He knew that the house, built in 1827, was a sound one, with beams cut with an axe and put together with wooden pegs. Chances were he knew more about the place than the owner, who lived in Maine. At any rate, hearing that the place was for sale, he bought it. Half of it is prairie land, the other half is red sandy soil.

Returning from Army service, Mr. McLemore started to re-build. He cleared the land with a power saw, put 1,000 acres in permanent pasture of lespedeza, dallis grass, Persian and White Dutch clover. He runs 100 head of grade Angus cattle on this pasture, will eventually have 600 head. He has a combination of Shorthorn bulls and grade Angus cows, gets a good crossbreed product.

Mr. McLemore put in blue lupine, an area favorite, as a soil builder. It makes twice as much green manure as vetch in this locality—seed with 225 pounds to the acre, and you get 40,000 pounds of green manure to turn under. You can make a crop of blue lupine, harvest the seed with combine, turn under the green manure, and still get a grain sorghum crop behind it. Blue lupine is planted here in October or November, seed is harvested in May or June, and grain sorghum is planted between June 15 and July 15.

After this rebuilding step, and with fertilizer applications, the cotton production is high. The land made an average of 180-pound yield at first against a Montgomery County average of 250 pounds. But in 1946, thanks to the blue lupine and fertilizers with trace elements, the average yield on the 250 acres allocated to cotton was 480 pounds of lint to the acre—a whopping 233 bales off 250 acres! The red sandy soil that had been considered too poor to grow cotton produced a bale to the acre. All this, in spite of bollworms—nine insect control applications!—which gave a lot of trouble and took a heavy toll.

In addition to the 1,000 acres in permanent pasture and 250 acres in cotton, Mr. McLemore has 120 acres in grain sorghums—Plainsman and Cap Rock milo and hegari, all combine types—60 acres in oats, 100 acres in corn, and 120 acres in blue lupine for seed production. All cultivated crop land is put in cover crops. There are only five laborers on the place, but there are six tractors, so that you will understand that Price McLemore is no stranger in the seat of a tractor. All the land is contoured, and four-row mechanized equipment is used on it. "You can turn

four-row equipment in 13 seconds on a 22-foot turn row," says Mr. McLemore, "and it takes longer to turn a mule around."

Price McLemore has an interesting method of planting his cover crop. He takes a grain box and mounts it on a nine-horsepower tractor, mounted high enough to leave the draw bar on the tractor free. He attaches a stalk cutter to the draw bar, then hitches a double disc harrow to the stalk cutter. This method destroys the old stalks efficiently and speedily, cuts to a six-inch depth, yet doesn't bury the seed too deeply. When the cover crop is turned under, it is set for an eight-inch depth.

Coker 100 wilt-resistant cotton is grown on the McLemore place. He gets foundation seed from Coker, and produces certified seed for sale. All cotton is planted on flat bed. Mr. McLemore emphasizes that this is the foundation of a successful mechanized operation, always planting on a flat bed and never throwing dirt to it. "When you throw up dirt, you're setting out a new crop of grass seed," he says. "The old method of a high seed bed is simply a holdover from the mule and hand method of cultivation." The cotton is hill dropped, spacing six or eight stalks to the hill 15 inches apart in the rows that are 40 inches apart. This gives 100,000 stalks to the acre, about four times as much as the usual practice, but ideal for mechanical cultivating and harvesting. Seed bed preparation and planting is a simultaneous operation and an application of 32 pounds of ammonium nitrate to the acre is put down at time of planting. In this way, the cotton breaks out of the ground growing!

Mr. McLemore always flames cotton before it comes up. "This gives good grass control, and is one of the greatest values of the flame cultivator." he says. "The weather never prevents this on more than one-third of your acreage. Thus we get a head start on two-thirds of our cotton acreage, can spend more time on the one-third that doesn't get flame if the weather is bad." As soon as the cotton is up it is tractor cultivated with rotary hoe attachments and sweeps, and this is repeated at weekly intervals until the cotton is six inches high and can be flamed.

In applying poison, Mr. McLemore falls back on his Air Corps training, and consults the weather bureau or the airport before either poisoning or defoliating. "A telephone call is cheaper than having to make another application," he says. "It's a general practice of farmers in this area to do this, and we've saved thousands of dollars by doing it. We lost no poison this past year. We also ask about the dew before we defoliate.

Mr. McLemore has one International Harvester high drum

cotton picker, and runs it 24 hours a day with two men. Four hours of each 24 is spent in servicing the picker—reloading with gas, greasing, oiling, etc. The picker consistently gets 14 bales of cotton picked each 24 hours by this method. Oil is used instead of water as the doffing agent, a pint of Tex-spray oil (same type as that used in cotton mills in breaking open bales) doing the work of eight gallons of water. The cotton can then be stored with no dampness, a decided advantage in a 24-hour picking plan.

Accurate cost records are kept on all operations, so that production costs are known. Each tractor is equipped with engine hour meters, and these are read and recorded twice a day. Mr. McLemore's 1946 cost records show that on land producing a bale or more to the acre his total cost, including mechanical picking was $56.28 per bale or 11.3 cents per pound of lint. On poorer land, where he got only a half stand and about half a bale to the acre, this cost jumped to $135.50, or 27.1 cents per pound of lint. In 1946, according to his records, he put a bale of cotton in the wagon in his fields with 11 hours and 15 minutes of labor, counting the entire operation from land breaking on through picking, all done with mechanized equipment. That contrasts with the 235-man-hour total for producing a bale under old methods.

Mr. McLemore has not only kept an accurate cost record on various steps in cotton production, but has gone out of his way to show that custom picking is feasible. In 1945, when his mechanical picker was new, he did some work for his neighbors and his picker brought in over $2,500 in revenue for custom picking that season. And his idea wasn't half so much to make money on the operation as it was to show his fellow farmers that the mechanical cotton picker was a farm tool they should have!

These farm records kept at "The Oaks" are simple, and are posted by a part-time worker—a school girl who gives a little spare time to it, but whose work keeps Mr. McLemore posted on progress that he's making.

It was in January that I visited "The Oaks" and learned from Price McLemore how he had hit on the idea of the flame cultivator. He told me about an interesting experiment he's conducting this year. He's taking a 55-acre section of his farm, a two-mule farming operation under the conventional method. He's assigning one tractor and one laborer to this 55-acre "farm within a farm" this year, and is keeping separate cost records on it. 30 acres have been put into cotton, 14 acres in improved pasture on which beef

cattle will be grazed, and 11 acres had blue lupine planted on it (the seed were harvested in May or June) and grain sorghums went in before July 15. Every operation will be mechanically handled this year. One of the tractor manufacturers is cooperating, by furnishing a small tractor for the experiment, one designed for just such a small farm operation. Tractor cultivation, flame cultivation of the cotton, and mechanical picking this fall will be followed with this crop. By the first of 1949, Price McLemore should be able to spring some accurate cost figures that will be revealing, and very likely will establish the feasibility of such a farming operation.

Price McLemore has branched out as a columnist this year, writing a monthly column for *"The Progressive Farmer."* In it, he's been outlining some sound principles of farming the mechanized way, and has been using his own experience as an example. He began the series with this premise: "Mechanization of farming is in reality the applying of engineering principles to farming and is called mechanization for the lack of a better term. The most common fault in converting from mule farming to power farming is the attempt to make tractors, flame cultivators, and other cultivating implements do the same tillage job that the mule and hand labor do. The tractor and tillage implements are capable of doing a vastly superior job of cultivation. The flame cultivator when properly employed is superior to the common hoe. It is poor economy and wasteful not to take advantage of the superiority of these implements by operating them properly. A similar parallel would be to operate a modern ten-ton truck with the same load and at the same speed as an oxcart.

"A farmer cannot adopt halfway measures of mule and tractor farming and expect to attain maximum efficiency and results. Having made up his mind to practice mechanized farming, he should forget all his mule farming and prepare to learn a new technique of planting, tillage, and harvesting from beginning to end. In mechanized farming, the entire technique is a sequence and series of operations which must follow each other without variation as surely as night follows day. It calls for an entirely new approach, not only to cultivation but to field layout, soil maintenance, implements used, picking, ginning, and the labor force."

Yes, Price McLemore has made an outstanding contribution to agriculture. He's only 39 years old now, young enough to enjoy in years to come the products of his alert, inquisitive mind, and to test his philosophy that nothing is impossible, at least until he's tried it!

Kentucky's Wonder Grass

Condensed from The Hereford Journal

Harold Severson

WHEN cattlemen in the Southeast first heard about Kentucky 31 fescue, most of them laughed off early reports. You couldn't blame them. After all, a grass with all the virtues that Kentucky 31 fescue was supposed to possess sounded too good to be true. Seed growers claimed it thrived on poor, eroded fields and at the same time adapted itself to rich bottom land. Even during the coldest winter months it was reported to make some growth but nevertheless it also grew during the hottest kind of weather. It was said to establish itself quickly on wet overflow land and at the same time to have a great deal of drouth resistence.

Capping all these claims was the assertion that Kentucky 31 fescue could more than hold its own in competition with weeds and shrubs. Growers in Trigg and Christian counties in southeastern Kentucky solemnly claimed it would quickly smother out wild onions.

"There's bound to be something wrong with this 'wonder grass!'" exclaimed one cattle breeder. "Maybe it's a pest like Johnson or Bermuda grass."

Wrong again. Kentucky 31 fescue never has become a pest for it can be controlled easily merely by plowing.

Most important of all, this Kentucky "wonder grass" was quickly accepted by livestock as a palatable and nutritious plant.

Today, Kentucky 31 fescue is accepted as one of the finest grasses growing in the South. Demand for seed has increased to a remarkable extent during the past four or five years and seed growers have been unable to meet the demand. To meet the clamor for seed, a group of Kentucky farmers have banded together to form the Kentucky 31 Fescue Growers' Association with headquarters at Hopkinsville, Ky. When this year's harvest was completed around July 1, a relatively small amount of seed was left for late buyers.

Stockmen who have tested this grass for several years are confident it is going to make Kentucky's fields green in winter as

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well as in summer. The same is true for the rest of the South.

William C. Johnstone, Kentucky extension field agent in agronomy, points out that Kentucky 31 fescue is an all-year grass. It will give stockmen grazing every month of the year. It has a capacity for punishment that is almost unequalled. Visit different parts of Kentucky and you'll find it growing on poor upland soil, in marshes, on well-fertilized pastures, on dry hillsides. It stands heavy grazing.

A Texas or Iowa Hereford breeder seeing Kentucky 31 fescue for the first time might think it is unpalatable to livestock. The opposite seems to be the case. Where livestock have an opportunity to graze it and other common grasses selectively, they have eaten it freely. It is primarily a pasture grass because it produces most of its leaves at the base of the stems. It is a perennial bunch grass that grows to a height of 2½ to 3 feet. Its leaves rise mostly from the crown of the plant rather than from the stems and they are shiny, dark green, coarse and stiff. There is a noticeable sheen to this grass when the sunshine hits it. Heads are 3 to 6 inches long and are branched much like redtop and Kentucky bluegrass.

A good many farmers call this fescue by its early name of Suiter's grass. That's because it was first noticed by a Kentucky farmer named William M. Suiter living near Frenchburg in the eastern part of the state. When he bought his mountain farm about 50 years ago, Mr. Suiter noticed a few spears of green grass growing on one of the steep fields. When he went to plowing that field, he noticed his horses cropped at the grass whenever they had an opportunity. This impressed him, so he avoided plowing under the grass. That summer he harvested a handful of seed and in the fall he sowed the seed on the hillside. He repeated the harvesting and sowing year after year until finally the entire steep slope was covered with this green grass.

The Kentuckian's horses and cattle liked the grass, and he himself liked it because it provided green grazing even during the cold mountain winters.

In time, some of Mr. Suiter's neighbors followed his example and planted seed they obtained from him. Unfortunately, the grass's reputation for the time was confined to that community. The years rolled past and then one day back in 1931, Prof. E. N. Fergus, the agronomist in charge of pasture and forage crops at the Kentucky agricultural experiment station, Lexington, came to Mr. Suiter's home county to judge a

sorghum show. The farmer invited him out to his place to identify the strange grass. Professor Fergus soon identified it as a meadow fescue but was intrigued by the fact it was still green in November.

Determined to test out this all-year grass at Lexington, the agronomist took some of the seed with him to the experiment station. He planted several plots and found that it made a fine growth. However, plantings made from commercial fescue seed did not do at all well. The field tests were complete failures. Whereas the Suiter strain of meadow fescue flourished in even the poorest ground.

Professor Fergus and Mr. Johnstone are convinced that the Suiter strain is a superior strain of meadow fescue. According to Mr. Johnstone, it probably was brought to Kentucky from Virginia many years ago and gradually, through a natural process of selection and adaptation, has accommodated itself to harsh conditions of climate and soil.

Some people claim Kentucky 31 fescue is the same as Alta fescue. However, agronomists at the U. S. Department of Agriculture station at Beltsville, Md., point out that Kentucky 31 or Suiter's grass has been growing for more than a half century, whereas Alta fescue is a selection of tall fescue made by Dr. H. A. Schoth of the Bureau of Plant Industry at Corvallis, Ore., back in 1923. Therefore, although these two fescues do seem to be "identical twins," they nevertheless came into the plant world many years apart.

Cattlemen interviewed by this writer say it's possible to get more pasturage from Kentucky 31 fescue than from other grasses.

Mr. Johnstone visited the Suiter farm recently. The steep field on which this grass first was noticed is now over a half century old. It covers about five acres and has carried during the past summer three hogs, a team of work stock and several head of cattle. It was still green, however, and the sod was in good condition.

"When I saw this farm," related Mr. Johnstone, "I couldn't help but compare its green fields with the endless acres of brown lespedeza fields all over our state. Mr. Suiter rendered his fellow farmers a great service when he had the foresight to save the seed from those few plants 50 years ago."

Seed is now being shipped to all parts of the South. In case you want to try this grass, write to Mr. Johnstone in care of the Kentucky extension service, Lexington. He will, if possible, put you in touch with a grower or seedman with a supply of the seed.

Baffle Boards Keep Litter Dry

Condensed from Everybodys Poultry Magazine

W. C. Sanctuary

LAST winter was one that put litter management systems to a severe test. Here in Massachusetts, temperatures averaged almost 3 degrees below normal from November through March and the sun shone a third of an hour less each day than usual. From the standpoint of poultry housing, it was the worst winter since 1930–31 at Amherst.

To see how such modern litter innovations as lime, deep litter, the use of old litter, and insulation worked out under unfavorable conditions, we looked into the litter situation on 29 poultry farms. We classified the farms into three groups—those having good litter conditions, those with fair litter, and those where the litter was really damp. The numbers in each group were nine, six, and fourteen, respectively.

It was surprising to learn that when weather conditions were really bad neither depth of litter, lime, built-up litter insulation, single- or muliple-story houses, nor the use of old litter seemed to have much effect on whether the litter stayed dry or not. Under normal conditions, all these things do help, however, and are well worthwhile.

Among both wet and dry pens were those with litter as shallow as 3 or as deep as 8 inches. Half of the "drys" and half of the "wets" used lime. Other practices scored about the same.

It was surprising to some of us that there seemed to be no relationship between egg production and dryness of litter. Egg production was influenced favorably by insulation, however, and, as would be expected, experienced operators had drier litter and got more eggs from their birds.

At the University of Massachusetts we had our usual good results with litter. The only thing special about our houses is the baffles inside the windows. These baffles direct the incoming cold air down and restrict to some extent the flow of air out of the house. This helps to get a maximum amount of moisture carried out of the pens with the warm air.

In one experimental pen, where heavy breed birds have only about 2 square feet of floor space, the litter had a maximum water content of 33 percent on February 14.

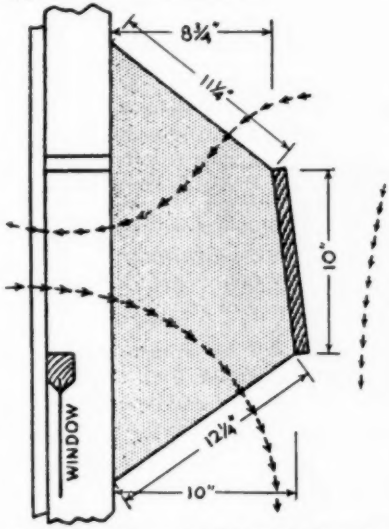
Reprinted by permission from Everybodys Poultry Magazine, Hanover, Pa.
October 1948

It was somewhat heavy in places, but the birds continued to dust themselves in it and there was quite a margin of safety under the point at which litter really begins to be wet—when it has a moisture content of about 40 percent. All equipment in this pen is elevated off the floor, giving birds the maximum use of available floor space.

In a pen where birds are allowed nearly 4 square feet of floor space, litter, including the area under the water fountain, was very dusty all winter. It has been this way ever since the baffle ventilators have been used. By February 14, when conditions were at their worst, moisture content of litter in this pen was 23 percent.

The litter in these pens was old, going through its fourth winter without change and with but little added. It was about 5 inches deep. Egg production was 70 percent for the winter months.

The baffles are simple to install, cost little, and seem to have done an excellent job wherever they have been used. We suggest having a square foot of baffled opening for each 15 birds. For a 20 x 20 pen we make the baffle board 10 inches wide, keeping it 8¾ inches in from the window frame at the top and 10 inches at the bottom. In a 30 x 30 pen the board should be a foot wide or more, 10 inches in from the window at the top and 12 inches at the bottom. The baffle is inside the pen and the top edge of the board is even with the top of the window opening. Arrows on the sketch show typical air circulation.



Here's how to put baffle boards in a laying pen. This sketch gives dimension for a 20-foot house. For deeper houses, use a wider board and keep it farther in from the window.

Good judgment is of major importance in ventilation, not only for the birds' comfort but for the sake of the litter as well. Only through the efficient use of air circulation can moisture be removed from the house and wet litter, with its many disadvantages, prevented.

You Could Have Had More Corn

Condensed from Successful Farming

Jim Roe

EDITOR'S NOTE. *Dr. Roger C. Bray, University of Illinois agronomist, developed the nitrate testing powder described here. Since the University cannot make it for sale, it is now available from the Urbana Laboratories, and the Illinois Soil Testing Service, both in Urbana, Illinois.*

RIGHT now is the time to plan your next year's corn crop. As you opened up the fields ahead of the picker, you had a good chance to check on the size and heft of the ears.

The chances are 7 to 3 that *you could have had more corn.* For 70 percent of the land in the Cornbelt would give profitable yield increases with extra doses of nitrogen.

Of all the plant-food elements, nitrogen is the one most often lacking. And it's the most expensive to buy. You aren't apt to buy several hundred dollars' worth and apply it just because you think the crop *might* need it.

Now, for the first time, we have an easy-to-use, accurate test which tells us when a plant *starts* to get hungry for nitrogen—long before the plant begins to show hunger signs. And this test isn't difficult to make. You can easily learn how to do it.

In corn, you'll want to start testing stalks about the middle of July. Test in 15 or 20 spots over the field. If a strong pink color shows up most everywhere, you're all right.

Keep testing, every 2 weeks, tho, up until the last of August. If the weather turns very cool, or exceptionally dry, the nitrogen-releasing bacteria will be slowed up. Test then.

If your test shows nitrate lack, and you think there'll be enough ground water or rain to dissolve fertilizer, you can side-dress with nitrogen thru the first week in August. Apply 2 pounds of pure nitrogen for each expected bushel of increased yield.

Since it moves in the soil water, nitrogen is the first element you'll lose to dry weather. A soil too dry to continue releasing nitrogen will still have some phosphate and potash available. Thus, by adding chemical nitrogen as soon as it's needed, you can, in effect retard drouth damage.

In these dry spells, you'll notice your best-handled fields will continue to feed the crop nitrogen long after poorer fields have

Reprinted by permission from Successful Farming, Des Moines, Iowa. October 1948

stopped. Keep the soil in good tilth, well supplied with organic matter. This way, it will hold water better, feed the crop longer.

During a cold, wet spring, you may want to test soil before corn-planting. Put 1 part each of soil and testing powder in a small bottle, and add 7 parts distilled water. Then shake, and let settle. A strong pink means nitrogen is being released fast enough to start the crop. If you get no color, you may want to step up your starter fertilizer a little. You can use this same test at wheat-seeding time.

With small grains and pastures, you can use the test any time during the growing season, especially during a cold, wet spring. Or if your pastures don't seem to recover from grazing as fast as they should, test the grass for nitrogen hunger.

To test, take a few leaves of the grain or grass. Fold them into a sheet of filter paper, available at any drugstore. Then sprinkle a little of the test powder on the paper.

Now, fold the paper over another time or two, to hold the grass and powder in. Then give a good squeeze with a pair of pliers. This squeezes moisture from the leaves, to moisten the powder. Unfold the paper. If the grain or grass has been getting nitrogen, there'll be pink stains on the paper. If there are none, you may want to top-dress the field.

After testing the soil, or any crop, use your own judgment. More fertilizer may not always be the answer. Think back on what you have put in the soil. If it's too tight, or cropped out of other fertilizing elements, just adding nitrogen won't help you much. Get a complete soil test, and add all the elements you need, plus organic matter.

Doctor Bray has been working on his testing powder for 10 years. Now, it has been released for general farm use. We are coming to realize that our rotations are not maintaining the organic-matter level at a point high enough to make the nitrogen-release rate adequate for big crop yields.

Even tho we supply phosphate and potash, and keep the soil in good tilth, it's still not enough. As we shove yields higher with good farming practices, and with hybrid varieties, we're finding that these yields often take more nitrogen than the soil can supply. This test tells *you* when and where to supply the rest of the needed nitrogen.

Sudan Grass

Condensed from Ohio Farm and Home Research

L. E. Thatcher, C. F. Monroe, and R. S. Davidson
Ohio Agricultural Experiment Station

SUDAN grass, a native of the Egyptian Sudan in Africa, first introduced into the United States in 1909, has proved to be a most valuable forage crop in all but a few regions of the country. Its major use has been for emergency hay and pasture when the regular crops intended for this purpose have failed, or when the livestock load has increased beyond the capacity of the regular crops to meet the demand.

The Ohio Agricultural Experiment Station began testing Sudan grass in 1912, 3 years after its introduction into the United States. It was given first consideration as an emergency hay crop in comparison with the sorghums and the millets. Its value for midsummer pasture was not fully appreciated for the first 10 years after its introduction. From then on its use for pasture increased rapidly, and now greatly exceeds its use for hay in most of the corn belt states.

For some time after its introduction into the United States, Sudan grass continued to give satisfactory results. With its continued use in a given locality, however, it became infected with certain foliage diseases that greatly limited its usefulness. This was the experience of the Ohio Agricultural Experiment Station on the Pasture Research Farm when, in 1937, Sudan grass was introduced into the pasture program as a means of helping to solve the usual midsummer pasture shortage.

An attempt was made to grow Sudan grass at frequent intervals in certain paddocks, but by 1941 it was evident that foliage diseases were becoming more prevalent and reducing midsummer growth to such an extent that it became necessary to abandon its use as a part of the regular rotation. Many Ohio farmers have had similar experiences and so Sudan grass has been limited largely to occasional use for emergency purposes.

The development and introduction of disease-resistant varieties of Sudan grass have increased

Reprinted by permission from Ohio Farm and Home Research, Columbus, Ohio.
July–August 1948

its potential usefulness as a dependable forage crop.

Tift variety was developed at the Georgia Coastal Plain Experiment Station at Tifton, Georgia in cooperation with the United States Department of Agriculture. A hybrid was made by crossing Common Sudan grass and Leoti sorgo, a sweet, juicy sorghum that possesses much resistance to bacterial leaf spotting.

Out of some 30,000 second-generation plants back-crossed upon Sudan grass, one was found to possess marked resistance to the foliage diseases that were so destructive on common Sudan grass. This was subsequently named Tift. The principal weakness of Tift is its lack of seedling vigor, a characteristic probably inherited from its sorgo parentage.

Sweet Sudan is also derived from a cross between Common Sudan and Leoti sorgo followed by repeated back-crossing and selection at the Texas Agricultural Experiment Station. Sweet Sudan was first introduced by the Texas station in 1943. It has a sweet, juicy stalk which may account somewhat for its palatability. It is said to be somewhat resistant to chinch bug attack.

Sweet Sudan is less resistant to foliage disease than is Tift, but more resistant than Common Sudan. It makes a slower recovery after close grazing than Tift. The seed of Sweet Sudan has a distinctive sienna glume color.

The present article recites our experience at the Ohio Agricultural Experiment Station at Wooster in 1947 in which the three varieties of Sudan grass (Common, Sweet, and Tift) were seeded in strips in a pasture paddock and grazed by dairy cattle. This is the first report on record of the effect of disease on the palatability of Sudan grass to livestock.

The three varieties were planted in a 2-acre pasture paddock on July 3 (about a month later than the normal date for seeding Sudan grass at Wooster). The seeding was made with a grain drill at the rate of 25 pounds of seed to the acre.

By August 12, the Sudan grass had reached a height of 12 to 14 inches and was ready for the first grazing. Ten dairy cows were turned into the 2-acre paddock and grazed for 10 days, at the end of which time all varieties had been grazed evenly and fairly close to the ground. The cows were observed daily and there was no apparent difference in the palatability of the three varieties of Sudan grass up to this time.

Wire cages 4 feet by 4 feet and 18 inches high were set up in the strips to protect the Sudan grass from the grazing of the cows and

the areas under the cages were harvested on August 11 as a measure of the amount of growth made by the Sudan grass up to that time. The acre yields, reduced to a moisture-free basis, were calculated as follows: Tift 3,290 pounds, Sweet 3,070 pounds, and Common 3,130 pounds. The yields were practically the same.

The cows were removed from the paddock for a period of 11 days. The Sudan grass made rapid recovery and was ready for the second grazing by September 3, and lasted for 5 days. At the end of that time, there was a marked difference in the amount of Sudan grass left on the different variety strips. The Sweet variety was grazed close, the Tift fairly close, whereas the Common variety had scarcely been touched.

That the different varieties had made about the same amounts of growth during the period was shown by the cage harvests made on September 8 which were Tift 3,180 pounds, Sweet 3,125 pounds, and Common 3,065 pounds. The Common Sudan grass was badly diseased and it was obvious that this had, in some way, influenced its palatability.

Helminthosporium leaf blight caused by *Helminthosporium turcicum* Pass. and Anthracnose caused by *Colletotrichum graminicolum* (Ces.) G. W. Wils. were present in varying amounts on the three Sudan grass varieties, following the 11-day interval between the first and second grazing periods. Both diseases were observed at the beginning of the first grazing period but neither disease was present in epidemic proportion.

Common Sudan grass is highly susceptible to both leaf blight diseases; Sweet variety is somewhat less susceptible to both diseases, while Tift variety is moderately resistant to both.

Both diseases reduce the yield of seed on infected plants. The seed produced on plants with Anthracnose is often shriveled and with low germination. Helminthosporium leaf blight may be seedborne and has been reported to reduce germination as much as 25 percent on seed held in storage for as long as 2 years. The inoculum for Helminthosporium leaf blight may originate either from the infected Sudan grass seed or from wind-borne spores from Helminthosporium leaf blight on corn which is caused by the same fungus. However, there is no evidence that the Helminthosporium leaf blight which occurs on Sudan grasses will spread to corn.

The chief purpose of this work was to see which variety of Sudan grass would be preferred by milking cows. In order to do this a

maximum number of cows was used. This number consisted of five Holsteins, milking from 40 to 70 pounds daily, and five Jerseys, milking from 20 to 35 pounds daily. The cows were watched on the pasture to see if they showed any preferences.

During the first grazing period of 10 days, there appeared to be little or no distinction made by the cows in regard to their grazing of the three varieties of Sudan grass. Neither the grazing habits of the cows nor the amounts of uneaten material left at the end of the period showed that the cows had made any decided preference. They ate this pasture with apparent relish and increased production after the first few days. The heaviest producer increased to a peak of 74 pounds of milk.

The carotene and the vitamin A content of the milk showed increases ranging from 25 to 35 percent. The cows had previously been on bluegrass pasture, but had been receiving grass silage in the barn. The silage feeding was discontinued when the cows were grazing the Sudan grass, but the grain feeding was continued as usual.

In the second grazing period the cows ate very little of the diseased Sudan grass, which was both evident in the grazing habits and in the amount of uneaten forage left at the end of the period. The production of the cows was also declining rapidly at the close of this period. This leads to the conclusion that the presence of disease was more of a factor in affecting palatability than the species difference.

Are Soys Hard on Soil?

Legumes often are poor when seeded on land that grew soybeans the year before. Purdue tests indicate beans may not leave enough available plant food to give the clovers a good start. The remedy may be a heavy slug of phosphate and potash. Both corn ground and soy ground were sowed to small grain. When each got 400 to 800 pounds of 0-12-12 an acre, legume yields on the bean ground were as good as those that followed corn.

—*Cappers Farmer*

Insulate Your House

Condensed from The Dakota Farmer

Louis Lubinus

"Does it pay to insulate" is a question often asked by homeowners. Insulation does pay in the long run, providing the job is done thoroughly and for a reasonable price. It pays in fuel savings and in additional comfort. A good job of insulation and weatherproofing may bring fuel savings of as much as 50%.

The purposes of insulation are to keep the house warmer in winter and cooler in summer. It also helps to prevent condensation on walls, ceilings, and floors. It holds warm air in the winter, giving a temperature differential that helps the ventilation system to work properly.

It is just as important to fill up cracks and other air leaks in the walls, floors, and around windows and doors as it is to place the insulation between the walls. In many old houses, there is as much as 25% loss of heat through cracks and openings around windows and doors.

Another 25% of the heat loss may occur through the roof. So, if it is impossible to insulate the entire house, start with the ceiling or roof. Heat naturally rises and the ceiling of a room usually is the warmest. You can save a lot of wasted heat if you get the roof to resist the transfer of heat. Whether insulation is placed in the ceiling or the roof depends on how you plan to use the attic space. If the attic is used only for storage, it would be most economical to put the insulation in the ceiling. But if you want to heat the attic, then the insulation should be placed in the roof. If this be done, an air space between the insulation and the shingles or other roofing material is essential.

Any type of material that slows down the movement of heat is an insulation. Generally speaking, dense, heavy materials are poor insulators. Light fluffy materials are good insulators. Wood is a good insulator; solid masonry is poor. Hollow masonry, such as concrete block and clay tile, is better than solid masonry. The air spaces in the hollow masonry provide some insulation.

Some of the best insulation materials are mineral wools, glass wools, mica products, rock wools,

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flaked gypsum, cork, marine plants, cattle hair, and plant materials such as cane, cornstalks, cotton, planer shavings, and sawdust. These materials are light and filled with tiny air spaces. Some metal surfaces make good insulators because they reflect or turn back nearly all the heat that is radiated to their surfaces.

Whatever insulation you buy, however, make sure it is resistant to fire, moisture, and insects. The form of insulation best suited to your use will depend on (1) how you intend to use it, that is, whether purely as insulation or as a wall finish, (2) how easy it is to put in and (3) how much you want to spend.

Insulation is manufactured in four different forms: rigid, flexible or blanket, loose fill, and reflective insulation. The form to use will depend on circumstances.

To be most effective, insulating material must be kept dry. Damp insulating materials fail to serve the purpose for which they were installed and they tend to settle and make conditions favorable for decay of wooden parts of the building. Moisture coming from the insulation gets between the paint and the wood causing peeling of the paint. All of these conditions are serious enough, but to top it all, you lose some of the insulation value of the material when it gets damp.

There is no well-grounded evidence to show that some insulating materials draw moisture. It's simply because we have a wall exposed to low temperatures on one side and to higher temperatures and rather high humidity conditions on the other side, that causes moisture to condense and accumulate inside the wall—unless provision is made to prevent it. A vapor seal must be installed on the warm side of the wall. This is very important in house insulation, because you have high humidity conditions in the home where cooking is being done, baths taken, and plants growing.

Vapor barriers or seals come in two forms: Paint barriers—among the best of these is aluminum paint with spar varnish as a vehicle. If you are insulating an old house by blowing fill insulation into the side walls, this type of barrier is most suitable. Two or three coats of aluminum paint make a very effective vapor seal. Then you can apply the decorative paint or paper over the aluminum paint in any color you like. Membrane barriers—these are usually a shiny-surfaced, asphalt-treated kraft paper or felt, smooth-surfaced roll roofing, or one of the metal foils.

The Common Liver Fluke

Condensed from The Cattleman

O. Wilford Olsen
Bureau of Animal Industry, U. S. D. A.

IN REGIONS where cattle, sheep, and goats graze on swampy pastures, ranchers and butchers are familiar with the common liver fluke, known to scientists as *Fasciola hepatica*. They are well aware of its great economic importance to the livestock industry.

What is less familiar, however, is how this fluke lives and perpetuates itself. Its life cycle is of such great complexity that, by comparison, our own lives and those of most animals about us are relatively simple and colorless. The liver fluke must spend a part of its life in each of two kinds of animals in order to reproduce itself. The adult fluke, which is known to many stockmen, lives in the bile ducts of cattle, sheep, goats, and rabbits, whereas the immature form lives in certain freshwater snails. Great hazards are met and successfully overcome by the flukes in passing from one host to the other. How this difficult and complicated life cycle is completed is one of the most fascinating stories in biology.

The flat, leaf-shaped flukes, which average about one inch in length by one-half inch in width, when mature, live in the bile ducts of the liver, where they lay their eggs. Since each fluke has a complete functional set of male and female organs, every individual produces fertile eggs—hundreds of thousands of them.

The microscopic eggs are washed from the liver into the intestine by the flow of bile. Here they are mixed with the intestinal contents, and finally pass onto the pasture in the droppings.

When examined with the aid of a microscope, the eggs appear like miniature brown footballs, each with a cap at one end.

In warm weather development of the egg is rapid, and in about two weeks a fully-formed larva can be seen wriggling inside. Hatching is accomplished when the larva forces the caplike structure open and escapes into the water.

The free-living larva (the stage outside the body of the host) is very active. It is roughly bullet-shaped, and is covered with a coat of short, moveable, hair-like structures. These serve as swim-

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ming organs, moving so rapidly that it is possible to see them only under the most favorable conditions—and then not too clearly.

The delicate, microscopic larva in this stage can live only a few hours, unless it finds a certain kind of freshwater snail in whose body it is able to develop. Its free-living existence, therefore, is spent swimming frantically about, searching for the right kind of snail, and refusing to enter all others it chances to meet. Having found a snail of the right species, the larva quickly attaches to its fleshy parts, and promptly burrows inside. Having gained entrance to the snail's body, it passes through several stages, multiplying several-hundred-fold in the process.

The snails which serve as hosts of the liver fluke are very common in the Gulf Coast area. In addition, they are prevalent in other sections of the country where conditions are favorable for their development. These areas include the Rocky Mountain region, the Pacific Coast, and some other areas.

Several species of snails are suitable hosts of the liver fluke, but inasmuch as they all belong to the same family, their appearance is similar. The shells have a clock-wise twist when viewed from the tip. They rarely exceed one-half to three-fourths inch in length. Their bodies are greyish color, and the feelers are flat and triangular in shape.

The favorite habitats of the Gulf Coast species of snail that serves as a host to the liver fluke are small, shallow, temporary pools, where the water is quiet and warm. Here the snails may be found in great numbers and all sizes, creeping over the mud, both in and out of the water, feeding and laying their eggs. Indeed, if one listens attentively, on a warm sunny day, beside one of these pools where snails are present, he will hear faint popping sounds made by them as they open their soft breathing tubes.

The large gelatin egg masses are plainly visible on the mud where the snails deposit them.

Each of these snails, like the liver fluke it harbors, has a complete set of male and female organs, and is very prolific. As many as 100 eggs may be laid at one time, all of them enclosed in a single gelatin mass. Not being content with such prolificacy, some snails increase their progeny by laying eggs that contain as many as six embryos each.

The eggs hatch in warm weather and snails develop to sexual maturity and lay eggs, all within a period of 21 days.

Once inside the snail, the fluke larva begins to reproduce and new forms appear. The most ob-

vious of these is a large worm-like form. In warm weather this form develops in about five weeks after the larva enters the body of the snail. It may be found invading all parts of the snail's body in large numbers.

The larvae in this stage are elongated, sac-like forms, having two stump-shaped protrusions a short distance back from the middle of the body. The only other obvious character is a mouth located at the tip of the body which opens into a short sac-shaped intestine. The remainder of the body is packed with small tadpole-like forms, the youngest of the sexual stage.

This new, tailed larva first escapes from the large worm-like form and then from the snail's body into the water. It is the second free-living stage in the fluke's life cycle. The new, tailed larva is small, just barely visible to the naked eye. It swims about in the water by vigorously lashing its tail.

The tailed larva swims for only a short time, after which it settles on a blade of grass, or some other object in the water, drops its tail, and proceeds to secrete a double cyst about itself. The cyst serves to attach the young fluke securely to the grass and to protect it from drying if the water evaporates from the pool.

Ruminant animals, such as cattle, sheep, and goats, become infected by swallowing these flukes with the grass. In the digestive tract of the host animals the young flukes escape from the cysts, burrow through the intestinal wall into the body cavity, wander to the liver, and forcibly enter it. Inside the liver, they migrate extensively for about two months, feeding, and increasing greatly in size. These activities cause a great deal of damage to the liver, resulting in the formation of much scar tissue. At the end of the migratory period, the flukes enter the bile ducts, complete their growth in about one month more, and become sexually mature. Thus, the life cycle is completed.

Under ideal conditions, the shortest time in which the liver fluke can complete its life cycle is about five months, as follows: (1) the eggs hatch in about two weeks, (2) development is completed in the snail's body in about five to six weeks, and (3) sexual maturity is attained in the cow's, sheep's, or goat's liver in about 12 to 13 weeks.

Farm Mechanization

Condensed from The New England Homestead

L. E. Childers

THE long-time trend toward more complete mechanization of agriculture in the United States continues at the fastest pace in history. Production of power-operated equipment in 1947 was the highest on record, including 420,000 wheel tractors, but there are indications of even higher total production in 1948. Among outstanding current developments of special interest are the following:

Tractors and related machines or attachments for a wide range of operations on the smaller farms of 40 acres or less.

Design of tractors to fit the farm or the job to be done, providing clearer vision of operations of the working tools by front mounting of equipment on standard types, and in the case of some of the new smaller tractors by rear-mounting of the engines.

Development of equipment for specialized jobs on farms of all sizes and mechanization of many operations on secondary crops.

Automatic or semi-automatic operation of equipment, in many cases permitting one man to do the same job heretofore requiring a crew of two or more, and also reducing to a minimum the physical effort required in machine operations.

Increasing adoption of the free-running power take-off as standard or accessory equipment on tractors, permitting operation or stoppage of such machines as the field ensilage harvester, pick-up baler, corn picker, combine, and orchard spray rig independently of the regular transmission and also making possible full-speed operation of the working equipment with slow travel of the tractor.

Greater portability in machines of all kinds, including provision for travel over hard-surfaced highways, plowed or terraced fields, and back-country roads or trails, even with such equipment as disk harrows, without special preparation or hauling facilities.

Development of a wide range of sizes and types of new sprayers and dusters for application of new high-concentrate pesticides for control of both insects and diseases; of growth regulators, petroleum derivatives, and other chemicals for control of weeds in fields

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and pastures, row crops, and orchards; and of defoliants or other types of preharvest sprays or dusts to facilitate harvesting operations.

Further progress in the use of flaming both before and after planting as a means of controlling weeds on a number of different crops.

Quickening of interest in crop driers as a means of saving the large part of certain crops that now is lost or damaged by weather during harvest or spoiled by heating and molds in storage. Artificial drying with forced heated air seems definitely here to stay. Further development in this field seems likely to come rapidly in the next few years, with possibly accompanying changes in field harvesting equipment and procedures.

Other similar trends might be cited. One is the continued increase in number of tractors on farms and the decrease in numbers of horses and mules. Based on preliminary results of a mailed survey, the Bureau of Agricultural Economics estimated the number of tractors on farms last January 1 at 3,150,000, which is more than double the prewar number. Present indications are at least five million in the next quarter of a century.

On the other hand numbers of horses and mules are expected to continue decreasing. On January 1, 1948, the number of horses on farms had already dropped to the lowest level in history while the number of mules was the lowest since 1893. The decrease in numbers of work stock has, of course, accelerated with the increasing pace of mechanization since the end of World War II.

Development of the small one-plow tractor has opened the way for a new era in tractor farming. It is perhaps the most significant event in the industry since row-crop tractors and rubber tires came into the picture, for these small power units make possible mechanization of operations on hundreds of thousands of small farms, particularly in New England, and the Southeast and hill-country areas of other States where larger tractors and equipment have not been so well adapted as in the level plains region where large farms are the rule rather than the exception. Such tractors are well suited for many of the light grinding, hauling, and seeding operations in poultry and dairy farming and other specialty types of production. They will also find a place on many larger farms as a secondary power unit for similar light tasks.

The small tractor has been long in coming, but it has arrived with a bang. It was forecast even before the beginning of the war, but the first one was not announced until the fall of 1945 and did not arrive on the scene in appreciable

numbers until the past year. Others have come into the picture since then, including the rear-engine models only recently announced. Along with these small tractors also have come others of slightly larger sizes but definitely in the one- and two-plow range designed for the medium-sized farm and for specialty crop work, such as orchard cultivation and spraying. The latter, in some instances, have wheels and working parts shielded to prevent catching on tree branches.

The increase in garden-type tractors also continues. Production in 1947 reached the all-time high figure of 168,687, compared with less than 10,000 a year before the war. In sizes ranging from 1½ to 6 horsepower, they are best adapted to part time farming and truck-crop production so have found their biggest market among operators of small acreages around larger cities. The wide range of attachments with which they may be equipped makes them useful for many light jobs.

The ease with which working tools can be attached or detached from tractors of all sizes is one of the labor saving features of modern equipment. With older models, changing from one implement to another often required the greater part of a half day. Now changes are made in a few minutes. Attachment of one new cultivator, for example, is done by driving the tractor into position, inserting one bolt, and drawing up a nut on each side then slipping lift pipes into place. Other machines are designed for similar quick changes. In most cases a complete line is available for each particular size or make of tractor.

Along with the trends toward development of small power units and soilworking implements, other machines for farmers who do their own corn picking, haying, and ensilage harvesting have been developed for power take-off drive. Newer models are lightweight but rugged and streamlined, several handling crops on a straight line from cutting or picking mechanism to the final harvested product whether it be husked corn, chopped or baled hay, or ensilage. The free-running power take-off previously mentioned is a decided advantage in their operation. Control of the entire operation is in the hands of the tractor operator who may constitute the entire crew.

Hydraulic controls that are becoming increasingly popular on tractors of most makes are being used for control of all types of plows, cultivators, disks, harrows, rakes, and other implements that require adjustments up or down or otherwise to perform their work properly under varying field conditions. The system makes use of oil under pressure for transmission of the power required in operating

lifts or other adjustments. It consists of three essential units. These are the power control mechanism made up of a pump, valves, and fluid supply tank; a "slave" cylinder fitted with power pistons or plungers for completing the desired action; and oil hoses or supply lines to connect the power mechanism and cylinder.

Advantages of hydraulic control are numerous. It eliminates wheels or clutches on the power-lift tools. It is simple in operation, does away with many parts, and is therefore economical to maintain, requiring few repairs. It provides positive operation and means of controlling depth of implements or adjusting them for varying field and crop conditions. It gives the operator effortless touch control of his equipment.

Advances in control of weeds, insect pests, and fungous diseases since the beginning of the second World War have been more rapid than at any other period since the beginning of modern farming. These have resulted from development of new concentrated sprays, such as DDT for insects and 2, 4-D for weed control. The big improvement in spray rigs and nozzles, booms, and the pattern of the sprays laid down has come in the last two years.

One of the most interesting of the new materials from the standpoint of equipment development is, of course, 2, 4-D. It is without doubt the most valuable herbicide yet developed and its possibilities have not yet been fully explored. It also may prove dangerous from the standpoint of crop damage or loss when improperly used, as some growers have found to their sorrow.

Last year in the Ohio River bottoms near Henderson, Ky., 2, 4-D was used effectively in controlling weeds on 18,000 acres of corn and in this one instance its use has been estimated to have added a million bushels to the corn crop. On the other hand, its improper application resulted in extensive damage in some limited areas, particularly where it drifted to cotton in the South, indicating the extreme caution necessary where the material is applied. Progress in use of such weed control chemicals, as well as in application of new insecticides and preharvest sprays, is dependent to a large extent on developments in application equipment. A big field for further development and improvement lies ahead in the coming seasons.

The future potentials in 2, 4-D and similar developments in agriculture, and further mechanization on the farm can not, of course, be entirely foreseen. It is certain, however, that many changes will be made in production methods in years immediately ahead. Already mechanization has completely altered the pattern of agriculture in this country and it is now in posi-

tion to push ahead rapidly in the coming decade.

One of the major objectives in all the years of farm equipment development and improvement has been to shift the burden of heavy labor from the worker to the machine. Progress has occurred not only in field machines but also in the mechanization of chore operations. Increasing attention is now being given to these jobs, which on dairy and poultry farms in some areas may require 80% of the labor time. The watering of livestock and poultry, once a burdensome task, can now be made completely automatic with modern equipment.

Electrically controlled barn and poultry house ventilators are coming into the picture. Milking is now almost completely mechanized. Feed grinding and mixing are simple tasks where either electric or tractor-powered equipment is used, especially with overhead bins. Even removal of silage from the silo for feeding is yielding to mechanization. New sanitation equipment is reducing the labor requirements of cleaning and handling manure in both barns and poultry houses. One of the greatest opportunities for labor saving on farms in the future lies in further mechanization of such day-to-day tasks.

During and since the last war additional facilities were added by the equipment industry for manufacture of new machines or equipment. Capacity is now at a record level not only because of new plants but also because many new companies have recently entered the field while others already well established have added new units to their lines. That is one of the reasons why supplies of some types of equipment are becoming much easier to obtain. In other cases there are still not enough machines available to meet all farmers' needs.

Keen competition in the industry has always stimulated improvement of equipment offered to farmers and maintenance of reasonable prices. Although figures on price tags tended to rise along with other commodities in the last year, the additions generally are well in line with rising material costs and factory wages.

The index of farm equipment prices since prewar has risen less proportionately than those of most other commodities farmers buy and less than the index of prices received. It is also below the index of farm wages, which is an important factor in farm production costs. The need for eliminating highpriced hand labor wherever possible as a means of reducing production costs has been a stimulating influence in mechanization for the last several years.

An Agricultural Revolution

Condensed from The Pennsylvania Farmer

J. B. R. Dickey
Pennsylvania State College

About the time of the American Revolution some 175 years ago, farming in the older settled parts of Pennsylvania began to undergo a far-reaching change. According to what we can learn from early writers, agriculture in this country prior to that time was in a far from satisfactory state. Nearly every one in those days lived on farms, and in most cases the whole family worked from "can't see to can't see" just to provide enough to eat and wear. Without the wild products, fish and game, available they probably would not have fared as well as they did. There was not enough food produced to support large cities and towns. The farmer supplied nearly all of his needs himself. He saw little cash, and had comparatively little need for it.

The common practice was to clear an area by cutting and burning the timber and then to scratch up the soil and ashes with crude plows and harrows, or by hand, and grow corn, potatoes, wheat, buckwheat and other grain crops needed for mush, bread and griddle cakes. In six or eight years, by the time some of the smaller stumps could be got out and the land really cleared up, the meager supply of organic matter in the originally forested soil, and the calcium, phosphate and potash in the ashes from the burning, were about used up. Yields of wheat dropped to less than 10 bushels per acre and the land had to be taken out of cultivation and "rested" for a term of years in weeds and native grasses until it could grow another crop or two. In the meantime clearing had to go on to provide a constant supply of new and relatively productive land. When the supply of clearable land ran out more had to be bought, or the farmer "went west," where more could be had for practically nothing, and the process was started over again.

The livestock industry was in a similarly sad state. There was little grain to be spared for feeding to animals. The only con-

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siderable amount of hay put up was apparently grown on relatively small level areas which could be irrigated during the summer. Much ingenuity and labor was expended in leading small streams around the hillsides so that they could be turned onto these "water meadows," as they were called. They were considered a very valuable part of the farm and, with the necessary water rights, were the cause of many of the quarrels and lawsuits of that day.

We do not know now what sort of grasses grew on these meadows; perhaps they were coarse swamp grasses. Neither have we any definite information as to the nature of the native grasses which were reported to grow to some height in the more open parts of the forest. They may have been annuals or biennials which passed out when the heavier grazing of domestic animals prevented seeding. We do know that practically all our useful hay and pasture grasses and clovers (as well as nearly all of our bad weeds) were gradually brought in by accident or on purpose from Europe.

In the old days the stock ran in the woods and old fields and did well enough during the summer, but getting through the winter was probably a tough proposition, even without the wolves, bears, etc., on the frontier. Since there was little to feed animals except corn fodder and straw, it was customary to kill and salt down a good part in the fall for winter meat. Those kept over had to forage for a good part of their living, and in hard winters many of them froze or starved. Since not much stock was kept over or stabled to any extent, little manure could be collected for use in maintaining the fertility of the fields. And, since there was little to put in them, there was no need for large barns.

It is interesting to speculate on what would be the present condition of eastern agriculture if this situation had continued. Certainly the East would have been badly farmed out and washed away long ere this, and we would be depending for our food on the naturally more fertile prairie and irrigated lands of the West; which are by no means inexhaustible. We hear conservationists refer to the wonderful virgin fertility of our soils when first cleared, but in so far as the timbered country of the East is concerned, the above information on pre-Revolutionary farming conditions does not seem to bear them out.

Toward the end of the 1700's and in the early 1800's a most important step in our agriculture was taken. It was based on the

rather general adoption of red, or "English," clover. Clover had come into England from central Europe at a little earlier date and was not unknown to the Pennsylvania Germans, who had practiced soil improving rotations of a sort in the old country. It was occasionally mentioned in this country somewhat earlier, but apparently it did not come into common use until the application of lime or land plaster, which enabled it to thrive, became more or less common.

Limestone could be burned with wood, of which in the early days there was plenty. The "Dutch" knew something about the use of lime on land, since many of them came from limestone areas in Europe. Where limestone was not available locally it soon began to be hauled 15 or 20 miles; quite an undertaking with horses and wagons on the unimproved roads of that day. Usually the stone was hauled and burned in wood fired kilns on the farm.

While at least a ton of lime was needed per acre to grow clover on sour soil, and 100 bushels (four tons) were often used near the source of supply, the amount of land plaster required was small. A bushel per acre, we are told, sometimes brought almost miraculous results in the clover crop. Three hundred pounds per acre seems to have been the maximum used. Sometimes seed grain was simply dusted with plaster, and a hill of corn received what could be held between the thumb and two fingers. Just what the plaster (sulphate of lime) did is still a subject for debate. The amounts of calcium and sulphur supplied by normal applications were very small, but somehow it produced results. Plaster first came in by sea from Nova Scotia. Later it was brought down the Susquehanna, from mines in New York State, by raft and boat. It was ground in local mills and sold by the bushel.

Plaster, being required in very small amounts compared to lime, was used especially in sections remote from limestone and as a substitute for it, though sometimes both were used. After a while plaster seemed to lose its beneficial effect, possibly due to the exhaustion of soil phosphate; and about the time commercial fertilizers containing superphosphate (which is about half sulphate of lime) came in, plaster went out.

When farmers learned to grow clover on their fields they could then count on an abundant supply of good hay for winter feeding. This fostered the livestock business and started the building of the big Pennsylvania barns in which to store the hay and house

the large numbers of cattle and other livestock which could now be kept. Wintering cattle meant large supplies of manure which could be applied to the fields to maintain and build up fertility. Thus one good thing led to another. Not only did the clover furnish hay and consequently manure, but its roots and stubble put into the soil the organic matter and nitrogen without which the settlers' clearings soon became worn out and unproductive.

Timothy and redtop seem to have come into common use about the same time as clover and were sown along with it. They helped to assure a hay crop, even on rather sour soil. They could be mowed for several years if desired. They gave good soil cover to resist erosion and their fibrous roots added organic matter to the soil and improved its physical condition.

Since red clover could be mown profitably only one season, a new seeding had to be made every year in order to have a regular supply of legume hay. Farmers soon learned to make such seedlings, with no special soil preparation, in wheat and oats. To grow corn the old sod had to be plowed up. No one understood then how clover enriched the soil—it took the "scientists" another 100 years to learn the secret—but all good farmers soon realized that it did. Thus crop rotation, including sods, automatically evolved and became the regular thing on the well-managed farm. No longer did fields have to be "rested" and perhaps eventually abandoned.

With a good rotation and manure, and with lime or plaster to make the clover grow, grain yields improved so that the farmer had a surplus over home needs which he could take to market. Meat and dairy products could now be produced in much greater supply than the farmer and his family could consume. This meant more to be sold, more cash income, better homes and living conditions. Pennsylvania agriculture was getting on its feet and on a permanent and profitable basis. It could now feed the population of growing towns and cities where industry gave employment, and farmers now had cash to spend for the products of industry. It was no longer necessary for 90% of the population to live on the land.

As long as the soil grew good clover and grass sods at frequent intervals, especially if supplemented with manure and more recently with fertilizer, erosion was kept under fairly satisfactory control, fertility was maintained and farming was reasonably profitable. When clover failed, because the farmer did not realize

the need for lime, or could not conveniently obtain lime, or could not sell his products for enough to buy it; or when sods were mowed too many years before they were broken, agriculture was pretty sure to start down hill. Erosion began to be serious and farms began to be abandoned. This occurred in some sections of the state, especially in the 90's and early 1900's.

The South, which operated largely on a cash crop basis of cotton and tobacco, and where stock could get through the winter with little or no barn feeding, got along without sods and legumes in the rotation but as a result generally suffered terrific erosion and soil exhaustion losses. Southern farmers are only now belatedly learning about and adopting some of the essentials of a permanent agriculture. Erosion control, without getting at the fundamentals, is a very difficult if not hopeless proposition. The Corn Belt, with more level soils of high natural fertility, and the Wheat Belt farther west, did not have to adopt sods and rotations for several generations; but their failure to do so has been gradually catching up with them in the form of reduced yields, deteriorating soil condition and more erosion.

Eastern agriculture in recent years might be said to be now undergoing another revolution brought about by greater commercialization, more specialization and mechanization. All of these, except in livestock farming, are apt to exert a strong pull away from established rotations including sods. With modern machinery we can now plow and cultivate a much higher percentage of our acreage than was formerly possible. With specialized crops it may be a temptation to do so. Unless organic matter and soil condition are maintained, however, one may find himself in serious trouble, just as were the farmers of pre-Revolutionary days.

When land is cleared nowadays we follow a different plan from that of the pioneer farmer. Usually the clearing is sown to grass and clover for pasture. With perhaps a little help in the matter of lime fertilizer these usually take hold and grow pretty well on a clearing. Later when the stumps have rotted enough to be easily removed and the land is put into crop production we have a sod to plow and the grass roots have had time to add organic matter and put the soil in shape. If a good rotation is followed it can continue to produce. It would seem then, that instead of virgin, timbered soils being rich and fertile, rather it is necessary for the farmer, through a good rotation,

to make, as well as to maintain, the real fertility and good physical condition of his soil. If he fails to do so the whole proposition soon falls flat. We read that it takes Nature centuries to produce an inch of top soil which improper farming may destroy in a few years; but perhaps man is a more rapid and efficient operator than Nature, in this as in many other respects.

Just what agencies were largely responsible for the introduction and fairly rapid spread and adoption of the ideas of clover and crop rotation it would be hard to say at this late date. Washington and Jefferson worried and wrote about erosion and soil depletion, but seem to have failed to find the fundamental key to the trouble. The "gentlemen farmers" of the Philadelphia Society for the Promotion of Agriculture were some of the early experimenters prior to 1800. They were among the few who then had the time, means and education to see the need, to try new ideas and to discuss them at their meetings. They published "pamphlets" (the first agricultural bulletins) on their findings and ideas; but probably very few of them were read or taken seriously by dirt farmers.

Some credit is doubtless due the Pennsylvania Germans who brought the germ of the idea with them, but did not seem to put it into practice at once. A part of their religion, and one of their principal interests, was a permanent and productive agriculture, rather than the politics, fighting, hunting and pioneering which were, in general, the main interests of the day. Their preachers traveled and visited other parishes. They no doubt carried word of successful farm practices from one section to another.

Preachers of other kinds were also instrumental in spreading the word. If their parishoners fared poorly on their farms the parson had a hard time collecting his salary, even in the terms of pigs, calves and farm produce. One prominent Chester county Presbyterian clergyman, in the early 1800's, was said to have been an equally fervent and enthusiastic expounder of religion on Sundays and lime on week days. He labored in a non-limestone section which was said to have been desperately poor until the coming of lime and clover. In a day when travel was not common or easy, the clergy got around more than most and saw what went on elsewhere. They read what little was written on agriculture before the rise of the farm paper, and many of them had farms of their own to help provide their living. They were the nearest approach in those days to the county agricultural agent. There was then no

F.F.A., A.A.A. or S.C.S. and no "incentive payments," but apparently none was needed to secure the adoption of a good and practical system of agriculture by the rank and file of good farmers.

Hormone Sprays

Condensed from the American Fruit Grower

L. P. Batjer
U. S. Dept. of Agriculture

WHAT'S new in hormone sprays? This question is frequently asked by fruit growers each year as the harvest season approaches. Surprisingly enough there have been very few basic changes in the use of hormone sprays since 1939. This was the year the U. S. Department of Agriculture first discovered that certain chemical sprays were useful in retarding the harvest drop of apples and pears. During the last eight years, however, research workers and growers have learned a great deal regarding the best and most efficient methods of handling hormone sprays in order to derive the greatest possible benefit from them. In this discussion an attempt will be made to evaluate the more recent developments in harvest sprays as well as to review and emphasize some of the more common pitfalls involved in the use of these sprays.

Naphthaleneacetic acid, or its sodium salt, is at present the active ingredient in practically all of the commercial hormone preparations for control of fruit drop. This was the chemical used in the first experiment in 1939 to prevent fruit drop. Since that time research workers have tested a large number of compounds but none has proved superior to naphthaleneacetic acid when all factors are considered. In this connection 2,4-D has given promising results only on Winesap and Stayman Winesap apples. With these varieties a 10-parts-per-million spray of 2,4-D has a much longer duration of effect, as well as a greater intensity of effect, than does a naphthaleneacetic acid spray. 2,4-D has been applied from four to 10 weeks ahead of harvest on these varieties and remained highly effective in preventing drop throughout the harvest period. In

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September 1948

several instances, both in the East on Stayman Winesap and in the Northwest on Winesap, the use of 2,4-D has resulted in injury to foliage and fruit the year following its use. In most cases this injury has not been of sufficient magnitude to be commercially serious; but until a safe program of concentration and spray timing can be worked out, it would not seem advisable to use 2,4-D sprays on an extensive scale. 2,4-D has been tested on a large number of other varieties without effect. It is difficult to understand why 2,4-D seems to be specific only within the Winesap group.

In recent preliminary work in Michigan a modification of 2,4-D, 2-methyl 4-Chlorophenoxyacetic acid (commercially known as tolxoy), has shown indication of being superior to naphthaleneacetic acid on the McIntosh variety, particularly in having a longer effective period. Further work is needed before this chemical is properly evaluated.

Because of the limited effective period of hormone sprays it is necessary to make applications during the busy harvest season. There are difficulties in handling conventional spray equipment in many orchards during the harvest period; picking boxes and props present a problem, and often orchards are so closely planted that portable equipment and spray hose cannot be managed without knocking off a considerable amount of fruit. Because of these difficulties some growers prefer to apply these sprays either in dust form or by means of the airplane. The latter method has become very popular in the Northwest during recent years. In 1945, 1946, and 1947 between 15,000 and 20,000 acres yearly were sprayed by this method. The standard procedure with the airplane has been to apply approximately 48 grams of naphthaleneacetic acid, which is dissolved in 5 gallons of solution (40 percent summer oil), to one acre of fruit. With the conventional method of application, about the same amount of hormone is used (48 grams) per acre of mature trees; but this amount of chemical is contained in 1200 gallons of solution (10 parts-per-million concentration) rather than 5 gallons as is the case with the airplane method. With the airplane, therefore, the hormone is applied in greatly concentrated form (approximately 240 times that of a conventional spray). Experimental work in the Northwest has shown the airplane to be somewhat less effective than the conventional method; but it generally gives satisfactory control of drop. The use of the airplane has several distinct advantages from the point of view of orchard management; among the most important is the fact that the spray can be applied with extreme ra-

pidity, making more exact timing possible; it also relieves the grower of a laborious operation during the busy harvest season.

Application of the hormone in dust form has become a standard practice in certain sections, particularly in the Northeast on the McIntosh variety. Applications of 3 to 4 pounds per tree of 0.1 percent dust are made. Three pounds of a 0.1 percent dust contain the same amount of naphthaleneacetic acid as 30 gallons of a standard 10-parts-per-million spray. Under eastern conditions dusts have been proved to be equally as effective as liquid sprays. Under arid conditions of the Northwest, dusts are not satisfactory because of the low atmospheric humidity and the absence of dews.

So far as is known, the directions for use accompanying all the commercial materials for preparing hormone sprays are calculated to give a spray solution of 10-parts-per-million concentration of active ingredient. Under many conditions a half-strength spray (5-parts-per-million), if correctly timed and thoroughly applied, will often give effective control of droppng. This is particularly true in the case of summer varieties. Increasing the spray concentration above 10-parts-per-million sometimes proves desirable on McIntosh and Wealthy in the Northeast, yet double-strength or triple-strength sprays (20- or 30-parts-per-million) may cause faster ripening.

Timing is the most important single factor in the success of harvest sprays. The spray usually becomes effective two or three days following application. It generally reaches the peak of effectiveness in five or six days and may continue very effective for 10 days to four weeks, varying with such factors as variety, tree and foliage condition, soil moisture, and temperature. For best results the spray should be applied at the very beginning of drop. If applied too far in advance of the harvest drop, the effect may be largely dissipated before drop begins. If delayed until drop is well under way, little or no benefit may be derived. With McIntosh, which has a relatively short period during which the spray is effective, close day-to-day observation on a number of typical trees is necessary in order to determine when sound, mature apples are beginning to drop. In some instances, particularly with McIntosh, a second spraying five to 10 days following the first application will extend the effective period considerably. It is important, however, to make the second application before the effect of the first one runs out.

Relative to thoroughness of application the question is frequently raised as to whether it is necessary to hit the fruit stems. Recent experimental work in the

Northwest showed that the foliage is the most important tissue in transmitting the stimulus responsible for retarding fruit drop. When the fruit stems were treated (without contacting the foliage) only a slight retardation in drop was obtained. It was further found that spraying the foliage on one spur had no appreciable effect in retarding fruit drop on an adjacent spur. In other words, thorough spray coverage is necessary in order to obtain the most effective results from hormone sprays.

Since the advent of hormone sprays some fruit growers and shippers, on occasion, have held that the use of these sprays resulted in inferior keeping quality of their fruit. In discussing the possible relationship between hormone sprays and fruit maturity, it seems advisable to consider separately the direct and the indirect effects.

With fall and late fall varieties the direct stimulatory effect of standard-strength hormone sprays on the ripening of the fruit is so slight as to be of little or no practical significance. With regards to indirect effect on maturity, it should be emphasized that with the effective use of hormone sprays a certain amount of fruit that otherwise would drop remains on the tree. Naturally these fruits are among the most mature, and if they are not harvested within a reasonable time they become overmature, watercore is likely to develop, and their keeping quality is impaired. This same overmaturity would develop whether these most advanced fruits were prevented from dropping through the use of hormone sprays, or whether drop had been prevented by mechanical means, such as fastening the fruit to the spur with tape in such a way that the connection was not severed.

Variety and temperature prevailing during the harvest period will determine how long one can safely delay picking and still not impair the keeping quality of fruit which was destined to drop had it not been sprayed. With such varieties as Delicious and McIntosh, one should resort to selective or color picking, particularly during unusually warm seasons, in order to avoid overmaturity of fruit prevented from dropping by hormone sprays. Before the discovery of hormone sprays, a grower was much less likely to allow his fruit to become overmature on the tree because of fear of excessive drop. When the situation required it, he resorted to selective or color picking. If he failed to do this, the ripest fruit dropped and, though he sacrificed tonnage, he was partly safeguarded on condition because it was the overmature fruit that dropped. Prevention of drop through the use of hormone sprays does not do away with the neces-

sity of selective or color picking. On the contrary it makes such a practice with certain varieties more necessary than ever before to prevent possible losses in storage from overmaturity and breakdown.

The effective period of hormone sprays, while admittedly limited, is sufficiently long (if properly timed) in most cases to serve adequately the purpose for which they are intended. Fruit growers should keep in mind that one of the chief reasons fruit drops is because it has reached maturity. Therefore, if harvest is delayed too long as a result of using hormone sprays, losses from overmaturity may offset any advantage obtained from drop prevention and increase of color and size.

Nitrogen Helps Winter Wheat

Condensed from Iowa Farm Science

L. B. Nelson and W. L. Pritchett
Iowa State University

TOP-DRESSING winter wheat with nitrogen fertilizer will usually increase the yield. We found this out in 19 field trials we made in the major wheat growing area in western Iowa. Nitrogen fertilizer raised yields 6½ to 12 bushels an acre on 4 out of every 5 of the fields tested. And the top-dressing produced a better quality wheat—a wheat higher in protein.

Iowa isn't a heavy winter wheat producing state, but farmers in southern counties grow quite a little wheat. The average yield usually is around 20 bushels per acre.

How much yield increase you get from nitrogen fertilizer will depend a lot on your soil. Our field trials showed the best response to nitrogen was on low-yielding fields where legumes had not been grown for 2 or 3 years.

Twelve of the fields we studied were in this low-yielding group. The yields on plots without fertilizer averaged 17.9 bushels an acre. To see how these fields responded, we top-dressed several different rates of nitrogen fertilizer in the spring when the wheat was 5 or 10 inches high.

Adding 20 pounds of nitrogen per acre (equal to 60 pounds of

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ammonium nitrate or 100 pounds of sulfate of ammonia) raised the yield by 6½ bushels per acre. Double this amount raised the yield about 10 bushels, and 80 pounds of nitrogen (four times) increased the yield by 12 bushels per acre. Beyond that adding nitrogen increased the yield only slightly.

Four of the fields studied were in a medium-fertility group. Without fertilizer these plots averaged about 22 bushels an acre. While 20 pounds of nitrogen boosted the yield 5½ bushels, and 40 pounds caused an increase of 7½ bushels an acre, higher rates of fertilizer actually caused the yield to drop. In other words, 40 pounds of nitrogen were about all that the plants needed. Above that amount we got lodging which cut down the yield.

Three more trials were on land of high fertility. The soil already had enough nitrogen to produce a top yield. On these fields the yield averaged about 36 bushels without fertilizer.

It is difficult to produce more than 35 to 40 bushels per acre in Iowa during most years even with fertilizer.

Notice what happened when we applied nitrogen fertilizer to this high fertility land. In every case, adding nitrogen caused a drop in yield. Why? The extra nitrogen was too much; severe lodging made the yield of wheat actually harvested lower than before.

Adding nitrogen fertilizer on your wheat can improve its quality.

If you use 20 pounds of nitrogen or less, don't expect much of an increase in the protein content. Small amounts of nitrogen fertilizer may actually give you a decrease in some cases. These small amounts stimulate the growth and increase the yield, but there isn't enough nitrogen left over to increase the protein content.

Nitrogen fertilizer does not delay maturity as many people believe. If your field is low in fertility, using up to 40 pounds of nitrogen to each acre is more likely to hasten maturity along. Only if your field is high in fertility or if you apply excessive amounts of nitrogen are you likely to delay maturity.

All of the yield increases talked about so far have been from top-dressings of nitrogen made in the spring when the wheat was 5 to 10 inches high. It looks as if this is the best time to apply nitrogen in the form of ammonium nitrate or sulfate of ammonia.

We laid out an experiment to find out whether spring is the best time. When we applied 125 pounds of ammonium nitrate per acre in the fall, our yield increases averaged only 2 bushels per acre. Applying the same amount of ammonium nitrate in the spring

gave us increases of 9 bushels an acre. Even half as much fertilizer —63 pounds of ammonium nitrate per acre—applied in the spring brought higher returns than the full rate put on in the fall.

Top-dressing with calcium cyanamid in the spring may injure the young wheat plants. Instead, apply cyanamid in the fall, a week or so before you sow the wheat.

Chances are nitrogen won't be your only wheat fertilizer problem. Your soil also may lack phosphorus or potassium, or both. If so, you'll want to fertilize for these too.

First have your soil tested and find out if you need either phosphorus or potassium.

If your soil is lacking in these elements, apply 200 to 300 pounds per acre of 0–20–0 or 0–20–10 to the acre. Broadcast and disk it, or drill it when you seed your winter wheat in the fall. Don't wait until spring. You'll get best results from most nitrogen fertilizers by applying them in the fall.

You'll get the full returns from your nitrogen fertilizer only if you take care of the phosphorus and potassium needs of your soil, too. And the reverse is also true —you'll get best returns from phosphate and potash fertilizers with plenty of nitrogen.

The same is true of lime. It takes a complete balance of soil elements to make those top yields possible.

Here's a check-list to guide you in your winter wheat fertilizer program:

If soil tests indicate a need for phosphate or potash fertilizers, apply them in the fall when you sow your wheat.

If you apply nitrogen, wait until spring and top-dress it uniformly over the field when the wheat is 5 to 10 inches high.

On low-yielding fields where legumes have not been grown for the past 2 or 3 years, apply 20 to 40 pounds of nitrogen per acre. (That means 60 to 120 pounds of ammonium nitrate or 100 to 200 pounds of sulfate of ammonia.)

On high-yielding fields where you expect 30 or more bushels of wheat per acre, don't use any nitrogen fertilizer.

Either ammonium nitrate or sulfate of ammonia can be used for top-dressing in the spring. If you plan to use calcium cyanamid, apply it a week or so before you sow the wheat in the fall.

Better To Buy Than Inherit A Farm

Condensed from Farm Journal

E. B. Hill and Russell L. Berry
Michigan State College

WHAT'S the best way to keep a farm in the family?

We say: "Sell it to the boy who's going to run it—and do it while the boy is still young, and before you die and the brothers and sisters get into a squabble over it."

You'll make it easier for yourself, for your son, for your other children—and you'll do the farm a favor, too—if you do it that way.

The greatest advantage in selling the farm within the family is that it is a clean-cut deal. So many other family transactions are not.

One day, not so long ago, I was on a farm in one of the best sections of Michigan. The land was good, but the buildings were run down. The whole place looked shabby and poorly cared for. I soon discovered why.

The man running the farm was one of the six brothers and sisters, who had inherited the farm jointly from their father. None of the five heirs living off the farm wanted to put anything into the place. And neither did the man on the land, so long as the estate was unsettled.

On another farm, I met a man 59 years old. At that age he had just inherited a share of his farm from his mother. If he is going to stay on the land, he's going to have to borrow money to pay off the other heirs. That's pretty late in life to go into debt for a farm.

These are just two instances out of many I could cite that prove an inherited farm often is no bargain.

Sometimes it's a mistake to try to keep the farm in the family. Sometimes the farm isn't large enough, particularly if it is going to have to support two families. And not all sons are born to be farmers.

But if the farm is right, and the son wants to farm, what do you do?

One way many folks try is by father-and-son partnership agreements.

A partnership agreement is a good place to start, but it's only a beginning. It's simply an understanding about the operation of

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the farm business as a going concern. It is best, usually, to keep it separate and apart from a farm property transfer agreement.

But within two to five years after the partnership is begun, or when the son has acquired a family, it's high time to agree on how the son and his wife are going to come into ownership.

There are four common ways that property is transferred within the family:

1. Inheritance, with no will.
2. Deed, subject to life lease or life estate.
3. Wills which may give, divide, or sell the farm.
4. Sales, or other contracts, while the parents are living. Let's look at them, one by one:

Inheritance. The worst feature is that the son has no way of knowing how long he must wait before the farm becomes his own. Often he is so old himself that it does him little good. Meanwhile improvements often are delayed.

Deed, subject to life lease. Under this arrangement, the parents give their farm to their son, but they keep on getting the farm income as long as they live. The son is sure of the farm, but his parents have very little security.

If the son should die first, all the parents have left is the right to farm the place, or rent it to someone else, as long as they live. It belongs not to them, but to their son's heirs.

Transfer by will. A will can say who is to get the farm, at what price, and on what terms. It may say what payments the heir must make to other heirs, and over what period of time. (This period should be specified, so the inheriting son won't have to mortgage the farm to pay off the other heirs right away.)

Where there are several heirs involved, inheriting a farm under a well-drawn will is far better than inheriting under no will at all. However, it still doesn't give the son any security during his parents' lifetimes. He still has to wait to get the farm, and they can always change their wills without his consent, or even without his knowledge.

Sale or contract. This is usually the best way. If the parents really want to give their son and his family the security of farm ownership, they should do it while they are alive and he is still young.

Selling the farm to the boy gives the parents income from their estate. It creates a more liquid estate (money), which is easier to distribute.

Most sons won't have enough cash to pay for the farm outright. For them a contract type of purchase is best. Then the parents

keep title until the farm is paid for, but the son has the security of a contract that will give him ownership when he's met his payments.

If the parents wish, such a contract can provide that the son will furnish a home and farm products to his parents as long as they live. The payment can be cut accordingly. Or, if desired, the contract may provide that the unpaid balance will be cancelled when the last surviving parent dies.

This kind of contract lets the son make the improvements he wants to, and carry out his own farming program. At the same time, it gives the parents a continuing interest in the home farm. It doesn't put them out in the cold.

In the long run, an inherited farm may be a poor bargain, and a farm bought under contract may be the best deal for everybody, even though it may call for an immediate outlay of cash.

Whatever you do, here are four practical suggestions:

1. Consider an early transfer.
2. Work out your own ideas of how the job can be done best in your own family. Keep an open mind.
3. Talk it over, not only with the son who will run the farm, but with any other heirs. Satisfy everybody now.
4. Consult a lawyer, and have him put your plan in writing.

Concrete footings are usually made as deep as the foundation wall is thick, and as wide as twice the thickness of the foundation wall. A foundation wall eight inches thick requires a footing under it eight inches thick or deep, and 16 inches wide. Steel reinforcing in the concrete is necessary for some soil conditions.

—Cappers Farmer

Pasture Renovation Pays

Condensed from The Southern Planter

THE renovation of old permanent pastures will pave the way for more lush grazing and extra dividends from higher milk production in succeeding years, according to dairy scientists in the U. S. Department of Agriculture.

In stressing the importance of a sound farm pasture program, they add that pastures contribute more than one-third of all feed consumed by livestock in the United States, and that more than one-third of the feed furnished by pastures is used by dairy cattle.

The yield and carrying capacity of nonproductive pastures, which usually are weedy and low in valuable legume content, can be increased by modern tillage and re-seeding practices undertaken either in the fall or spring, or at both times.

This fact was brought out recently by the first 3-year results of a long-time pasture renovation study now being conducted by the Bureau of Dairy Industry and the Bureau of Plant Industry, Soils, and Agricultural Engineering.

In a series of tests started in the spring of 1945 at Beltsville, Maryland, a bluegrass pasture that had been established for some years was manured, limed, and then thoroughly torn up with a double-disk harrow. The pasture was then fertilized with 500 pounds of an 0–14–14 fertilizer per acre, and immediately seeded with 8 pounds of alfalfa, 8 pounds of bromegrass, 3 pounds of red clover, and 2 pounds of Ladino clover per acre. The pasture was gone over with a cultipacker after seeding.

Results to date indicate that omitting the alfalfa and bromegrass and seeding only the red clover and Ladino clover is more economical for the eastern central states. In the Beltsville area orchard grass is generally preferred to bromegrass, and seeding a small amount per acre, not over 3 pounds, is beneficial if no orchard grass was present before renovation.

An adjacent pasture was not renovated, but it received the same amount of manure, lime and fertilizer as the renovated pasture.

Although the renovated pasture was not grazed the first year until July, the first-year yields, including a light and rather weedy cutting for silage, were two-thirds as high as from the unrenovated area on which grazing was started

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the latter part of April. Furthermore, the new pasture came into production when it was badly needed—at a time late in the season when untreated pastures had passed the production peak.

During the first full years of rotation-grazing, the renovated pasture provided enough nutrients for cows to produce 5,300 pounds of 4-percent milk per year, or about 51 per cent more than the 3,500 pounds of milk produced from the unrenovated plot.

Renovated pastures at Beltsville have maintained their productiveness through the third year, or as long as the experiment has progressed. To maintain pastures at a high production level, it seems logical to divide permanent pastures into several fields, renovating one field each year, thereby insuring improved pastures for use while others are being renovated.

They add that the greatest benefit from renovation comes from complete use of the herbage produced, which includes the making of hay or silage from the extra growth in the spring for feeding later in the season when grazing is short, or during the winter season.

How to Restore Cellophane When Brittle

Moisture-proof cellophane used for packaging foods for freezing is normally soft and pliable. Occasionally, however, a bag or roll may become dry if improperly stored in a very dry hot place.

Low humidity and heat reduce the moisture content of the film causing the cellophane to become dry, and perhaps too fragile to use. There are several ways you can restore brittle film to its original softness. Expose bags for four days or more in your refrigerator. For best results, hang them in groups of three or four. The tops of the bags can be attached to the refrigerator rack with paper clips.

Placing bags or rolls in a damp container for at least 24 hours before using is also effective. Whichever method is used, the important point is to expose the film long enough to restore original moisture content so that the film will be soft and pliable.

—Electricity on the Farm

The Farm Benefits From A Good Lease

Condensed from The Agricultural Situation

Max M. Tharp
Bureau of Agricultural Economics, U.S.D.A.

All over the country these days, landowners and tenants are sittng down together to talk over leases for the coming year.

If you are one of them, you are taking part in one of the big businesses of the country. Last year, tenants and part-owners operated rented land worth 23 billion dollars and they paid 3.2 billion dollars in rent. The rent alone is greater than the total cash receipts of all farmers in any one month of this year.

While the business of renting farm land is big, it is made up mainly of a large number of small transactions between individual landowners and tenants. Rates of rent, time of occupancy, and other terms of the contracts they make are usually determined by the customs of the communities in which they live.

You may find the customary way of doing things satisfactory in some situations. Often though, it results in a lease that is not desirable for either party and in the long run is bad for the farm.

For example, rent shares often are fixed by local customs. It may be that in your community the corn crop usually is divided 50-50. Such a provision can work against the best interests of one party or the other since it does not take into account what each contributes or the productivity of the farm. One tenant may pay for all of the hybrid seed while another pays for only half or none of it. Or to take another case, half the corn on a farm producing 25 bushels per acre is very different rent from half the corn on a farm where yields average 60 bushels per acre.

Instead of depending on local custom to fix rent shares, you may find it better practice to divide farm production on the basis of what each party contributes after carefully weighing the productive capacity of the farm. In other words, it is usually better to adapt the terms of your lease to your particular needs than to the customs of your neighborhood.

It is, of course, impossible to

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set down in one article specific terms that would apply to leases for farms in all parts of the country. However, there are a few principles that apply generally. If you are thinking about next year's lease, here are a few points you might want to consider:

Length of occupancy: The best job of farming requires long-range planning. Unless the lease provides stabile and secure tenure for the tenant he cannot plan for the future. The landlord also is handicapped since he has no assurance of keeping a good tenant when he has found one. Security of tenure enables the tenant to buy machinary, develop sound crop rotations, adopt technological improvements, and build up productive herds and flocks—practices that help increase the income of both tenant and landlord.

Long-term leases are one way of providing a secure tenure. However, you may object to a contract that runs for several years. In this case, a year-to-year lease containing a provision for automatic renewal might suit your needs. Such a lease would remain in effect until notice is given in writing. The period of notice required varies, but it usually should not be less than 4 to 6 months. An Iowa law, for example, provides for a 4-month notice. Leases containing automatic renewal clauses make the term flexible yet give a high degree of certainty of occupancy.

A fair rent: There may be danger in a fixed cash rent at a time when prices of farm products are likely to fluctuate widely. Share renting helps spread risks. Both the tenant and landlord share in the hazards and windfalls of changes in production and prices.

There also is danger in a rent that is either too high or too low. If the rent is too high, the tenant may have to "exploit" the farm to pay the rent, lower his level of living, or both. In either case, the farm and the working relationship between landlord and tenant suffer.

If the rent is too low, on the other hand, the landlord may not be able to maintain and improve the farm as a productive unit.

On an adequate sized, productive farm an enterprising and skillful tenant should be able to make money and accumulate capital. At the same time, the landlord's returns should be sufficient for him to maintain and develop the farm and provide a satisfactory rate of interest on his investment. In making a lease it is good practice to keep this goal in mind.

A plan for the farm: The possibility of a farm earning a fair

return for both tenant and landowner over the long-run is much better if the lease contains a plan for farm organization and management. Under most leases, tenants are uncertain how long they are going to stay on a farm or to what extent they will receive benefits from soil conservation and other improvements they make. For this reason, many tenant farms are not kept up as well as those operated by owners.

This shortcoming can be largely overcome by an agreement in the lease to pay the tenant for the unexhausted value of improvement made by him and left on the farm when he leaves. For example, some landlords and tenants use "conservation agreements," or "conservation supplements" in their leases.

A written lease: After you have talked over the various terms of your lease and agreed upon specific items, you probably will want to put them in writing. Of course, an oral lease is just as valid as a written lease but the latter has many important advantages.

Chief among them are: (1) you will not have to depend upon your memory concerning the specific items agreed upon and thus you may avoid misunderstandings, (2) you are likely to consider more carefully all details of the agreement when you put them in writing, (3) adjustments you make from year-to-year and from time-to-time throughout the year will be easier, and (4) in case of your death, your heirs will be protected against misinterpretation of the agreement.

If you want advice in making your lease, your county agent is a good man to see. For general information you can write your State College of Agriculture for bulletins or lease forms. Also you may be interested in the United States Department of Agriculture's two recent publications on leasing. (1) Better Farm Leases. Farmer's Bulletin 1969, and (2) Your Farm Lease, Miscellaneous Publication 627. Both of these publications are free. They can be obtained from your county agent or direct from the Department of Agriculture, Washington, D. C.

Crosses Find Their Niche

Condensed from the Poultry Tribune

R. George Jaap
Ohio State University

ANIMAL and plant breeders have known for a long time that when they cross distinct breeds or varieties, the offspring often are exceptionally vigorous.

In animals, the crossbred offspring may grow faster and produce more eggs, milk, or meat according to the type of animal. In plants, there also may be faster growth and a heavier yield.

Crossbreeding of poultry has been practiced for several decades. Until fairly recently, however, it was being done on a rather hit and miss basis.

Poultrymen quickly found that not all crossbreds were equally good. Some, in fact, had serious weaknesses. Always, good purebreds had to be used on both sides of the mating or the crossbred stock was not likely to be as good as the better purebred parent variety.

It is not surprising then that most of the common hybrids and crosses produced at the present time make use of at least one of the five varieties in which egg and meat production have been most highly developed.

According to records made in egg laying tests, highest egg production has been attained in Single Comb Rhode Island Reds followed by Single Comb White Leghorns, Barred Plymouth Rocks, New Hampshires, and White Plymouth Rocks.

When meat production is considered on the basis of pounds of feed required to produce a pound of chicken, certain strains of New Hampshires, Barred Plymouth Rocks, and White Plymouth Rocks, have come to the forefront.

While both egg and meat production have been well combined in some of the present strains, the fact remains that the most economical strains for egg production are not the most efficient meat producers. This difference in strains is most evident in New Hampshires where the best egg laying strains are rather distinctly different from the best broiler production strains. The gap is being narrowed, but, at present, the commercial broiler producer usually secures his New Hampshires from different breeders than do the commercial egg producers.

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The same condition holds true for other common heavy breeds, though probably to a lesser degree than in New Hampshires.

It is also interesting to note that when only one of these five varieties is used, it is usually the female parent of the crossbred or hybrid. This may be partly due to the fact that it is easier to secure high producing flocks of the more common varieties.

Crosses do not produce phenomenal advantages but when carefully chosen strains are used, the crosses have proved their usefulness and will remain a definite part of poultry production. Some of the disappointment in the use of crosses has come about due to the fact that poultrymen may expect all crosses to give similar results. This most certainly is not the case. One of the major developments in crossbreeding is that rather specific variety crosses have gained in popularity for specific purposes.

For the sake of helping to clarify the situation for those poultrymen interested in using crossbreds, some of the more popular crosses will be described briefly in this article and their place in egg and meat production explained.

Popularity of the various crossbreds and hybrids will vary in the different geographical areas. Names given to these chicks from cross matings also vary. Therefore, the more common designations will be used with no attempt being made to give all names under which the same type of cross may be offered for sale.

Barred Broiler Cross

This cross is most popular in the eastern states. For most efficient broiler production it is produced by mating specific broiler-strain Barred Plymouth Rock males with specific broiler-strain New Hampshire females.

All chicks from this cross have an indistinct type of barred plumage with a certain amount of silvery and brownish tinges. It is suitable only for broiler production and not for egg production. Occasionally unsuitable strains of Barred males and similarly unsuitable strains of New Hampshires or Rhode Island Red females are used. Invariably the commercial broiler producer reports less efficient growth from such poorly chosen parent strains.

Black or Sex-Linked Pullets

As the name would indicate this is a crossbred pointed primarily at egg production. They are produced by mating Rhode Island Red males of efficient egg production strains with Barred Plymouth Rock females of strains noted for their egg production. Like the Barred Broiler Cross, the Black Cross Pullets are most popular in the eastern part of the United States and in areas specializing

in a brown egg market. Occasionally the New Hampshire may be used instead of the Rhode Island Red as the male parent of this cross. In such cases it is essential that they be from a high egg production strain and not the type of New Hampshire most favored for the Barred Broiler Cross. The pullets vary from almost a jet black to varying amounts of brown around the head, neck and breast. In certain areas they find a ready market as roasting fowl.

Leghorn X Red Crosses

These crosses are produced for egg production in areas where distinctly white or distinctly brown eggs do not have any particular or consistent market preference. In most cases White Leghorn males are crossed with Rhode Island Red females. The Leghorns and "Reds" used should be from the best egg production strains available. These particular varieties form the final breed cross of the most common hybrid or incross mating. Leghorn-Red crosses have an almost white plumage with all individuals exhibiting varying amounts of black flecking and/or pale red coloration.

Hybrids from Incross Matings

These are a recent development in crossbred production. Thus far, all emphasize egg production and farm flock trade. None is suitable for the specialized production of heavy broilers. They differ from those previously discussed by virtue of the fact that they are derived from four parental strains of chickens which have been closely inbred. Thus the terms "incross matings" or "inbred crosses" are often used. To use the Red and Leghorn example, they are produced as follows:

Inbred White Leghorns—Males of strain A are mated with females of strain B to produce the incross White Leghorn males.

Inbred Rhode Island Red—Males of strain C are mated with females of strain D to produce the incross Rhode Island Red females.

The incross White Leghorn males, (AB), are mated with the incross Rhode Island Red females, (CD), to produce the incrossbreds (hybrids).

Each of the inbred strains are produced by very closely related matings which approach the equivalent of more than three generations of brother X sister mating.

For this type of hybrid or incross mating it is possible to use any breeds or varieties. It is expected, however, that the most common varieties will be more often used as parents.

Since all hybrids or chicks from incross matings are not superior, great care must be exercised in knowing the performance of the

particular hybrids. As is true in hybrid corn, each breeder has his own trade name and chicks are sold under different numbered lines.

Austra-White Cross

The Austra-White is produced from Australorp (black) males and S. C. White Leghorn females. This is a white-skinned chicken with white plumage interspersed with numerous black flecks. The pullets have a leaden blue shank color and lay a tinted (light brown) egg. The Austra-White has been most popular as a farm flock in the mid-west and is noted for its ability to produce a reasonably good number of eggs under rough treatment. It would appear that superior Austra-Whites, as is also true of all other crosses, depend upon the egg production capacities of the Australorp and Leghorn strains used to produce the cross.

Cornish Crosses

The original "broad-breasted" breed of chickens was the Cornish. During this period of emphasis on rapid growth most strains of Cornish have lost popularity. However, a few enterprising breeders have been improving the growth rate sufficiently that a few isolated strains of Dark Cornish produce good meat crossbreds with New Hampshires. Also, White Cornish males mated with White Plymouth Rocks are increasing in popularity. In all cases the Cornish rooster is used to sire the Cornish crosses. Two different Dark Cornish X New Hampshire crosses placed first and eighth, and a White Cornish X White Rock obtained fifth place among 40 entries in the recent Chicken of Tomorrow Contest. It should be emphasized that only a very few strains of Cornish are suitable for commercial cross mating for the production of broilers.

New Broiler Crossbreds of Promise

Two new crossbreds pointed toward the commercial production of white-feathered broilers are being produced. One of these is the *Columbian X New Hampshire* cross and the other, *Dominant Whites.*

For the Columbian Crossbred, columbian colored males of which the newly-suggested "Delaware" breed is an example, are crossed with broiler-strain New Hampshire females. The crossbred is a columbian colored broiler. When emphasis is placed upon rapid growth of both parents it appears that the crossbred is very efficient in economy of production of meat.

The Dominant White Crosses involve the use of a large-bodied special type of white rooster. The female parent is usually New Hampshire but may be any efficient broiler strain. A few of this type of crossbred are being pro-

duced in the northwest and are reported to be very efficient for broiler production.

White Egg Producing Crosses

At the present time there appears to be a distinct demand for egg production crossbreds which will lay pure white eggs. Like the new broiler crossbreds already mentioned, white-egg crossbreds are relatively rare at present. The greatest handicap to their production is the fact that the S. C. White Leghorn is the only common variety which lays a white egg.

If I were to forecast the future, I should predict that hybrids and crossbreds will become increasingly popular. It is doubtful, however, whether they will ever exceed the popularity of the standard breeds, at least not during the next 10 to 20 years.

New standardbreds, crossbreds and hybrids will continue to be developed. To help us evaluate their place in egg and meat production, we have (1) the reports of the national Egg Laying Tests, (2) the U. S. Record of Performance records, (3) Broiler Tests as those of California, Georgia, and Maine, and (4) the Chicken-of-Tomorrow Contest.

Cleans Barn in 7 Minutes

Getting manure out of a 52-cow barn and into the spreader is a 7-minute job on Grandview Farm, Kane county, Illinois, since mechanical cleaners were installed, E. P. Miller, manager, says. It is easier work too. Formerly it was a tiresome task of an hour twice a day for 1 man.

The cleaner is a push-pull, or oar type, machine with a separate unit in each gutter. The motor and operating mechanism are located outside the barn, but electric switches are inside. A shaft is pulled back and forth in the gutter by an attachment to an endless chain. On the forward pull, arms on the shaft drag manure forward. On the return stroke they fall back against the shaft.

Manure is dumped into an elevator chute and is carried by endless chain into the spreader. The elevator collects from both gutters. A portion is bridged over so cows and vehicles can cross. When cleaners are not operating, metal doors cover the gutter outlets.

—Capper's Farmer

Milk Cooler Heats The Milkhouse

Condensed from Electricity On The Farm

LAST March, Russell Jenkinson, Corunna, Mich. made some trials of heating his milk house with his ½ hp milk-cooler unit. The milk-cooler compressor was used as a heat pump. Later, tests were conducted in cooperation with George W. Adelman of Consumers Power Company.

Much is now being written about house heating with heat pumps. Almost any mechanical refrigeration machine is a heat pump. Applied to an ordinary household refrigerator, the heat is pumped out of the food and released into the room through a condenser. In a milk cooler the heat is pumped out of the milk by the electrically driven compressor and is released in the milk house. A milk-cooler, therefore, is a made-to-order heat pump. And the milk house seems to be a very logical place to use this heat pump.

There is one difficulty about using a milk-cooler compressor for warming the milk house in the winter time. Milk usually takes more cooling in the summer time. The compressor may run for only short periods in the winter time to cool the milk. Here's the way that difficulty was overcome on the Jenkinson farm: Well water pumped out of the ground reaches the Jenkinson milk house at fifty degrees. After the milk was cooled each day, this 50° water was turned into the milk cooler and allowed to run over the thermostat that controls the compressor. That kept the thermostat temperature up to the point where the compressor would continue to run. At the same time, this water circulating through the tank kept the tank from freezing up solid. After the heat was pumped out of the milk and released in the milk house, then some of the heat was pumped out of the well water and the cooled water allowed to run out of the overflow and into a drainage ditch where it soaked back into the ground. That was a heat pump ready installed and it worked.

The Jenkinson milk house is 12 x 12 x 7½ ft high, inside dimensions. It is in one corner of a larger building. The walls are made of uninsulated cement blocks. The ceiling is insulated with 1″ of celotex. There is about 15 sq ft of glass area. The doors and windows are not weatherstripped. The milk house is located on the northwest corner of

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October 1948

the barn and has a door at the northwest corner of the building.

The milk-cooler is an 8 can unit. It is equipped with a ½ hp air-cooled compressor and an air-cooled condenser. There is no agitator in the cooling tank. Four 10 gallon cans were being cooled each day. In normal operation a bank of ice is built up on the coils of the milk cooler.

When Mr. Jenkinson started his experimental heating of the milk house he just let the extra water run into the cooling tank without an automatic control. Later when tests were being made, that system was improved upon and an adjustable heat control was installed in the milk house. It could be set for any temperature desired in the room. When the temperature dropped below the point at which the thermostat was set, an electrically operated water valve was opened and the water was permitted to flow into the milk-cooler tank. The second-hand thermostat and electric valve with the piping cost $14.20. New units would cost more.

A 15 day test was made on the milk cooler as a heat pump, starting March 2, 1948. During the test the outside temperature varied from 8° to 44°. The inside temperature was held between 42° and 60°. The average temperature difference between the inside and outside of the milk house was 22.3°.

The thermostat controlling the room temperature was set for 40° at night and 50° in the daytime. It was found that if the man doing chores turned up the heat control when he came out in the morning the temperature of the milk house would rise 10° while he was doing the milking.

During the period when the compressor was operating to cool the milk, the flow of water into the tank was shut off by a hand valve. As soon as the milk was cooled, the water was again turned on. The rate of flow of the water was 90 to 100 gallons per hour. This was about one-quarter of the capacity of the pump. There was an adequate supply of water in the well. During the period of the test the thermostatically controlled electric valve allowed the water to run from 7 to 20 hours per day. With this particular cooler an ice bank was formed on the coils and the temperature of the water flowing out of the tank remained at about 42° regardless of the amount of 50° water flowing into the tank.

The milk-cooler compressor ran 57.5 per cent of the time during the 15 day test. Twenty-three per cent was in cooling milk; the remaining 34.5 per cent for heating the building.

The current consumption for cooling the milk was estimated at ¾ kw-hr per can cooled. The water pumping cost was based on

pumping approximately 1,000 gallons per kw-hr.

KW-Hrs Used in 15 Days Test

For cooling milk	45	kw-hrs
For heat pump operation	71	kw-hrs
For pumping approximately 11,500 gallons of water	11.5	kw-hrs
Total used for cooling milk and heating building	127.5	kw-hrs

Omitting the milk cooling, which is done anyway, and adding together the heat pump operation and water pumping gave 82.5 kw-hrs for 15 days. If this is taken as the average for the month, the total power consumption for heating the milk house during the month of March would have been 170 kw-hrs.

The advantage of using the milk-cooler as a heat pump is that you can get about three times as many heat units out of a kilowatt-hour under the conditions of this test as you can get out of electricity by direct radiation. The electricity supplied to the heat pump does not produce heat directly but just transfers heat from the milk and water to the air of the room. This transfer requires only about one-third as much electricity as direct electric heating.

The temperature chart shows that the milk house was kept at about 50° during the daytime. In addition to having a more comfortable place to work, there were no frozen pipes and it was surprising to note the improvement in the condition of the milk house.

When the experiment started, icicles were hanging from the ceiling, windows were completely frosted over and the whole building interior was very damp. All these undesirable conditions were eliminated in a very short time. Mr. Jenkinson was not handicapped by being required to work in a blanket of steam while caring for his equipment.

This is the first report we have had on a test of this kind. It seems the method has possibilities worth investigating. The ½ hp compressor used in this milk house was apparently large enough to provide satisfactory temperatures even without insulating the walls. Insulation and weather stripping would have saved heat.

The additional operation of the milk-cooler compressor will cause some extra wear. It is desirable to operate the milk-cooler occasionally during the winter to keep the valves and packing glands in condition so as not to lose refrigerant. An idle cooler may need overhauling and recharging in the spring. If there is any question about the extra wear, Mr. Adelman proposes that the heat pump might be used for maintaining a 24 hour temperature of 35° or 40° and other heaters be used for extra

warmth when someone is working in the milk house.

Water-cooled compressors and condensers do not lend themselves to milk house heating as readily as air cooled units.

Fire Hazards On Farms

Condensed from the Kentucky Farmer

FARM residents are in greater danger from fires than are residents of towns and cities, according to statistics of the National Fire Protection Association.

About one-third of the persons who are killed by fire live on farms, though only one-fifth of the people of the United States are farm residents. Last year, fires caused 11,000 deaths, 3,500 of them on farms.

The nation's monetary fire loss in 1947 was $700,000,000 and about $100,000,000 of this was incurred on farms. This total fire bill is approximately equal to:

The combined assessed property valuations of the entire states of Kansas, Vermont, New Mexico and Wyoming;

All the money on deposit in all the banks of Maine;

The yearly earnings of all the farmers of both South Dakota and Idaho;

And the value of every acre of farm land and every farm building in Oregon.

The most significant aspect of this tragic loss is that most fires are unnecessary. An analysis of fire causes has shown us that 90 per cent of all fires could be prevented. The reason they are not is that the American public is careless. If simple, common fire hazards were removed, the huge financial loss and the appalling death toll would be cut to a fraction of what they are now.

The National Fire Prevention Association directs a special plea to farmers because fire hazards are more numerous on farms than in towns and cities. Fire prevention experts point out that farmers keep large stocks of gasoline and kerosene; farms are in greater danger from lightning; farmers use large quantities of combustible materials such as hay, rags and feed bags; farmers have the problem of curing hay properly and keeping it dry to prevent spontaneous ignition, and there are more lamps and lanterns on farms.

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Here are National Fire Prevention Association recommendations for correcting farm fire hazards:

1. Stop careless smoking habits such as smoking in barns and other buildings where flammable material is stored or used, and use more care in discarding lighted cigarettes and matches.

2. Don't allow combustible rubbish to accumulate. It is dangerous to stack papers, magazines, old clothing, broken toys, discarded furniture, old feed bags and boxes in attics, closets or basements or in barns and other work buildings. Oily rags should be kept in metal containers to prevent spontaneous ignition.

3. Clean lamps and lanterns regularly, keep dust and cobwebs away from power machinery to prevent a stray spark from setting a flash fire, and clean the heating plant and the chimney at least once a year. Keep flammable material away from small stoves.

4. Replace flammable wood shingle roofs with fire-resistant roofing such as asphalt shingles, asbestos, slate or metal. The hundreds of communities which have building codes prohibiting flammable roofs have cut the number of roof fires so drastically that flammable roofing has dropped from third place among all fire hazards to seventh or eighth.

5. Gasoline and kerosene should be stored in metal containers away from main buildings. Never use flammable cleaning fluids; cleaning fluids which won't burn are available.

6. Repair defective electrical appliances and replace frayed cords promptly. Don't overload the capacity of a farm's electrical system.

7. Install lightning rods on all main buildings. An efficiently installed lightning rod system, kept in good condition, provides virtually perfect protection.

8. Cure hay properly and keep it under weathertight roofs.

Swine Type and Marketing Practices

Condensed from American Hampshire Herdsman

Rollie Pemberton

It has been said that the curse of the hog breeders of America is the ever-changing type. Perhaps the thought back of this is not so far wrong, but the inference is that a change of type is not necessary. It has been necessary. The real curse of the business has been that the changes have been too radical.

In the beginning of the pork production business in this country it was necessary to have a large hog because the only way of curing pork was the old-fashioned salt method. There was very little experimental or scientific work on the curing of meats. Therefore, in order to have any meat the following summer, cuts from heavy hogs were cured. Cuts from light hogs would be dried and literally burned up with salt. Then, too, there was a great demand for fat. Lard was the main source of fat for our pioneer ancestors. Most of the work in those days was heavy and in the open. Continuous exposure to the cold, bitter winters, and hard labor, made salt pork and pork of any kind a favorite with the American working man, whether in the coal mine, the steel factory, or on the farm.

Then came the improvement in the packing industry, the refrigerator cars, and the middle man. Lighter cuts could be handled. Better curing methods were developed. Fresh pork could be shipped. There came a demand for lighter cuts and more quality. Each breed rushed in, in order to get ahead of the others in this new demand. Some breeds went further than others, but most all of them developed a small, chunky type hog—a pony type, short, thick, rather heavy in the jowls and middle, fine of bone, with plenty of quality. But this type lacked prolificacy and rustling ability. Soon our pork producers began to realize that they had to get back to a more prolific type, a more rugged type, and the trend was started in that direction a few years before the first world war. There were breeders here and there that had kept the larger type, but they were relatively few. However, large type genes were hidden in the blood

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streams of all these animals making it possible by selection to change type quickly. This has been both a blessing and a curse to the American hog producer. When the war started in 1914, prices were good, but they went higher. The real high prices came after the war. From the fall of 1918 to 1920, prices went sky-high, and the type of hogs kept up with them. A short, steep pastern, a small middle, a high arched back, and a long lanky body conformation were the vogue. This type of hog began to win in the show ring, and about this time the National Swine Show officers, feeling that it was an opportunity to cooperate with the breeders, installed scales and began to weigh all breeds according to their individual age classes. These weights were publicized, each breed trying to reach up and up —1,000 to 1,200 boars, 1,000 pound sows. Right at the same moment, the packers and marketmen were bearing down on weight, penalizing for excess weight and paying the premium for the hog that would finish at 200 to 225 pounds.

Judges of our larger shows were placing up the big kind. Some hog breeders knew it was unsound, but could do nothing except fall in line by producing more size, cut hams, and rainbow backs. Along with the idea of a larger hog, there was being injected in the minds of people in general, and the hog producer, the idea that we needed a bacon-type hog. The grower seemed to develop the idea that a tall, hungry unfinished hog was this bacon-type that was being talked about. At the same time, they were being penalized as much as 75 cents a hundred at packing plants and concentration yards all over the country, especially in the Middle West. To have a good finished bunch of hogs from this extreme large type, a farmer had to feed them to weigh 350 to 450 pounds.

The day of reckoning came. Prices fell. It certainly was the black spot in the hog business in America. The type was wrong, the lard market was lost, the packers did not improve the methods of curing lard or marketing it, the vegetable fats were coming in (some being promoted by the packers themselves), and the foreign market was lost. The export trade was gone, especially for lard, Germany being the largest user. We lost our pork market to Great Britain because she was trying to hold her colonies together by buying everything she could from them. Central Europe started to produce hogs. We had Polish ham looking at us from the show windows of American meat dealers.

In the face of these realities the

type of hog should have changed quickly, but it came slowly. The American show ring was slow to turn its attention to a different type. The depression of the 30's came to give the hog man a headache even more unbearable. Since he had become quite immune to shock, the processing tax was tried out on him. This caused a good many housewives to change from using pork simply because they were told by many local butchers that they were paying the processing tax, and the people, especially at that time, were side-stepping anything with a tax.

Right at this time several of the packers, along with college professors and producer organizations, began to hold carcass cut-out demonstrations, and field days where these groups could discuss each other's problems. Packers studied the producer's problem. The producer was interested in the packer's problem in getting the dressed pork merchandized. They began to study carcass cut-out values. These cut-out values began to show everyone connected with the swine industry the proof of the pudding. Type conferences were started by some of the purebred associations. Many of these have continued to this day and have been instrumental in assisting the industry in arriving at a middle-of-the-road type of hog. We needed a medium type meat hog, one with the ability to produce good litters, grow fast and pay good dividends on the amount of feed consumed. In other words, a type that would produce pork economically, and when ready for market at six months of age, furnish a valuable carcass when slaughtered.

Many producers began to realize with a poor hog market that they must have prolific sows, sows that would save their litters, and litters that would gain. It was during these trying times that the commercial pork producer started to drive into the purebred breeder's farm, and before he got out of the car would say, "I'd like to buy a boar. I don't want a show pig. I want one for commercial use." Here and there were found a few hog breeders who had stayed with a meat-type hog. These were men who had been keeping sows because of the large number of pigs they raised; because these pigs were of that medium type that would finish for the market at 200 to 255 pounds, and because they realized that width of the back and width of the loin, and depth and thickness of ham, plus depth and smoothness of side were necessary to top the market. They also realized that rate of gain was important to the farmer and that excess quality at the expense of weight did not pay. The packers talked

about excess quality, but seldom paid for it. This small group of breeders was forming the nucleus of a medium meat type hog, and they began to make themselves felt, not in the show ring, not in the headlines, but in selling boars and breeding stock to farmers advantageously. Soon there began to be a feeling that this middle-of-the-road hog was more the desirable type, and some of the men who were judging hogs began to emphasize that type. The first year or so these judges were rather severely criticized by some of the old professional show-masters but the day was here. It couldn't be stopped. The farmer, who is the backbone of any livestock business, had said "no" to the extreme type of hog, and the hamless wonders.

At the outbreak of World War II, the pendulum in type was again swinging past center. Many breeders and producers were moving toward a shorter, fatter hog. Farmers were told that the fat pig was what they needed, and a few breeders and promoters began to promote the idea. Thus, we started once again down the hill of another extreme; a thick, short-bodied, dumpy, fat hog which invariably produces non-prolific gilts and boars that are not very active, and barrows with an excess of lard in proportion to lean, quality meat.

Today the pendulum has stopped; the industry has accepted an intermediate or middle-of-the-road meat-type hog. The war is over; we are still furnishing meat for the hungry people across the ocean. But these abnormal demands and markets are slowly but surely slowing down. The swine grower this fall is looking into a season of one of the best corn-and-hog ratios ever experienced by the industry. History tells us that a 13 to 1 corn-hog ratio tends to increase production. The in-and-outer in the hog business will move into swine production. For this reason it behooves each and every swine grower to produce the generally accepted middle-of-the-road meat-type hog. An over-production of hogs, a product, or a by-product, will be felt at once in the merchandising of your hogs. We only need to review last summer's debacle of a $7 per hundredweight cut on heavy hogs to realize what can happen.

Leaders in the swine industry feel that the producer is now on a dead-end street, unless the producer with quality meat-type hogs is recognized in our buying system. The producer with the cooperation of the packers and our educational leaders has made an all-out effort to arrive at a commonly accepted type and the kind of hog best suited for him

and the consumer trade. There should and must be recognition in the market places of this country if we continue to produce and improve these animals.

Our hog-buying system is antiquated. Our buying system has not kept pace with the improvement in other branches of the industry. You have often heard in the reports from terminal markets: "This drove of hogs was bought straight across the board." This means everything at one price with no recognition for quality or high yielding animals on a dollar and cents basis—just a plain grab bag system. Yes, we have heard packer representatives make the statement many times: "You need not worry about the lard market, we are always able to sell it." How about this producer who took at least a $7 per hundredweight cut in price from top hogs last summer? It will be some time before you can make him believe he need not worry about lard. He found out there was plenty of this by-product, and he was paying for it whether it worries him or not. We believe some of this penalty was justifiable, but it was made by weight, and weight only. Some of these heavy hogs carried a great deal larger percentages of lard and poorer quality pork than others, but there was no differential there, only in grades by weight. According to figures compiled during the past thirty days in a national carcass contest, we have the right to believe that there is at least two to three dollars per hundred difference in the actual value of many animals. Actually, a check on this particular contest with animals especially selected for it, reveals a variance of $4.85 per cwt, or $10.43 per head, in the value of the carcasses.

Every carcass contest held during the past ten years has shown that a dressing-percentage-buying basis does not correlate with the provision-man's figures in the packing-house when merchandizing dressed pork. In other words, the fatter the hogs, the better their yield in dressing percentage. But in the cooler, the excess fat which raises the dressing percentage in the live animal lowers the actual return in dollars and cents in the carcass. But dressing percent is the basis for our buying system and has been for thirty years. It was satisfactory to a small degree thirty years ago when lard sold at a premium. But, today, with lard at two-thirds the price of live hogs, it only takes simple arithmetic to figure that every pound of excess fat lowers the value of the carcass. Hogs are not purchased on the basis of the net returns for the carcass. Practically

the country over, our buying system is operated on a mine-run basis, with price differentials made by weight only. Then what is the answer?

I am not advocating rail grading. As yet, I doubt if it is the answer to a better hog-buying system in this country. There are many complications in its use here, and I don't believe it is necessary to rail grade in order to recognize the differences in value that our demonstrations have shown are there.

With a concerted effort, we can improve our present live-buying system at least 100%. This certainly would be an improvement for the industry. All the producer of good livestock asks is that we recognize on our markets differences in quality by paying in dollars and cents for at least a portion of it. We realize that with the adoption of such a system of recognizing quality, the producer of poor quality hogs will continue to want top prices for his hogs. This situation will require an educational program both in the country and on the markets to acquaint all producers with the various grades and differences in quality of hogs.

We believe this improvement can be made in our present system if we try, but if no effort is made along these lines, then we feel the answer is rail-grading. Any improved hog-buying system can only be brought about through the leadership and cooperation of our educational leaders, the packers, and the producers. Surely it can be done, and it should be on a sound and constructive basis to maintain and improve the production of quality meat.

We know of a few cases where packers have paid a premium for quality, where they also assisted the producer in the selection of good seed stock. This program paid dividends for all concerned. But these same firms must meet the competition of haphazard buying. A better hog-buying system should have the support of the entire industry. Then it can and will work toward the betterment of all concerned.

Milk Production In Pen Barns

Condensed from Guernsey Breeders' Journal

R. R. Graves and J. R. Dawson
Bureau of Dairy Industry, U. S. D. A.

In recent years there has been considerable interest and some controversy concerning the merits of two general systems of housing dairy cows. One system involves the use of the conventional stanchion-type barn. When this system is employed the cows are confined in stachions at all times, although in some cases they may be taken to a separate barn to be milked.

The other system involves the use of a barn or shelter of some sort where the cows can run loose and rest or "loaf" between the times when they are being fed and milked in another barn. The floor of the shelter or loafing barn usually is of earth on which bedding in placed. This provides a soft place for the cows to stand or lie down on. The floor of the stanchion-type barn is usually of concrete or other hard material.

In 1928 the senior author designed a barn for housing dairy cows which subsequently became known as a pen barn. It was a modification of the loafing or lounging barn, or open-shed system, that had long been used on the Pacific coast. In such barns the cows run loose as a group. The pen barn differs from the usual loafing or lounging barns in that it has a feed alley through the center and the area on each side of the central alley is divided into a number of small pens. A few cows can run loose in each pen. There are rigid wooden stanchions and mangers along each side of the feed alley where, if desired, the cows can be fastened and fed hay and silage. A gate from each pen to the central alley facilitates moving the cows to the separate barn in which they are milked and fed grain.

Pen barns patterned after the original design have been in use for a number of years at several field stations maintained by the Bureau of Dairy Industry. At first each pen was made to accommodate four cows, but when it was observed that the cows did not use about two feet of space on each side of each partition, with a consequent waste of bedding and space, the number of partitions was reduced and the size of each pen was increased sufficiently to

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October 15, 1948

accommodate eight or even 12 cows.

At the Bureau's field stations, fresh bedding is added daily to the pens and the tramping of the cows compacts the manure and bedding tightly. Often it may be allowed to accumulate to a depth of two or two and one-half feet, or until a convenient time is found for hauling it to the field. The accumulated material forms a soft, warm bed for the cows, and as long as enough bedding is used they keep fully as clean as cows in the stanchion barns. Urine is absorbed rapidly and there is far less scattering of manure and urine, by swinging tails, in the pen barns than in the stanchion barns.

This article gives the results of an experiment conducted by the Bureau of Dairy Industry at its Huntley, Mont., field station to determine the relative milk and butter fat production of cows housed in a pen barn and in a stanchion barn, and discusses some of the problems that should be considered in deciding which system of housing to use.

A pen barn was built at the Huntley station in 1930. Since then it has been the practice at this station to keep the yearling heifers in an open shed and, when they freshen with their first calves, to move them to the pen barn where they are put on official test. While they are on test they are allowed to run loose, by small groups, in the pens. They are permitted to eat alfalfa hay and corn silage at will, and are given some pasturage in season. A grain mixture is fed at the rate of one pound for each three pounds of milk produced, and they are milked three times a day.

After the first-calf heifers complete their official records they are available for use in feeding experiments. Cows on feeding experiments are housed in the stanchion barn because the mangers are divided and each cow can be fed individually.

Few cows at this station are ever moved to the stanchion barn until their second lactation period. It was observed that when the cows were put in stanchions for the first time, many of them became uneasy and did not lie down or rest comfortably. Often they became lame and developed swellings on the legs and sides, and occasionally they did not appear to produce up to the level expected of them.

The stalls are of standard design and the platforms are three feet, six inches wide, and five feet, three inches long. A standard alinement device is used to adjust the stalls to large or small cows.

In 1940 an experiment was planned to determine the relative effects of the pen barn and the stanchion barn system of housing dairy cows on their level of milk production. The seven heifers that were then on official test in the

pen barn were to be kept in the stanchion barn during subsequent lactations and handled under the same conditions of feeding and milking as when they were in the pen barn. At the same time seven other cows were being carried on a feeding experiment in the stanchion barn. They were getting a limited amount of grain (approximately one pound of grain for each nine pounds of milk produced) and they were to be kept on the same ration during subsequent lactation periods but housed in the pen barn.

Records were also to be kept of illness, lameness, and any other condition that might affect the production of the cows in both groups.

The cows on the full-grain ration produced at a high level, both in the pen barn and in the stanchion barn, but their production was decidedly higher in the pen barn. On a mature-equivalent basis, the average production was approximately 19 per cent more milk and 18 per cent more butter fat per cow in the pen barn than in the stanchion barn. Six of the seven cows made better records in the pen barn.

These were the first records that these cows had made when kept in stanchions. The fact that they had spent their first lactation period in the pen barn and that they were not accustomed to stanchion stalls may have been partly responsible for their lower production in the stanchion barn. However, of the three cows that had two successive lactation periods in the stanchion barn—two produced less and one produced more during the second lactation. One cow produced 183 pounds more butter fat in her second lactation, when her condition was normal, than in the preceding lactation when she suffered from sore feet and had six attacks of mastitis.

When kept in the pen barn the cows consumed on an average 7,296 pounds of total digestible nutrients as compared with an average of 6,950 pounds when they were kept in the stanchion barn. They averaged 21 days more on pasture when kept in the stanchion barn. The average gain in weight was 176 pounds in the pen barn as compared with an average gain of 135 pounds in the stanchion barn.

Only one cow in the stanchion barn escaped having sore feet or lameness during the first lactation, but two of the three cows that were housed in the stanchion barn for two successive lactations had no trouble of this sort during the second lactation. The sore feet were apparently caused by standing on the hard concrete floor, since there was no evidence of infection such as foot rot or foul foot. These cows were not troubled with sore feet or lameness when

they were housed in the pen barn, but two of them had attacks of mastitis in the pen barn and two had attacks of mastitis in the stanchion barn.

Cows on a limited-grain ration, without pasture, produced at a lower level than the other group, both in the stanchion barn and in the pen barn. Their average production was higher in the pen barn than in the stanchion barn, but the difference was much less than in the case of the group on the full-grain ration. On the average they produced seven per cent more milk and six per cent more butter fat in the pen barn; four of the seven cows made better records in the pen barn than in the stanchion barn.

The cows consumed somewhat more feed when they were kept in the pen barn. The nutrient consumption averaged 9,253 pounds in the pen barn as compared with an average of 7,805 pounds in the stanchion barn. The average gain in body weight was 119 pounds in the pen barn as compared with only 41 pounds in the stanchion barn.

In this group mastitis was more general while the cows were in the pen barn, four of the seven suffering from 13 cases of mastitis in the pen barn. One of the most persistent cases was that of a cow which had had a severe attack in a previous lactation in the stanchion barn.

Lameness in this group, as in the first group, was more general in the stanchion barn. Many of the cows refused to lie down in the stalls early in the lactation period, but they would lie down immediately after being turned out into the lots.

Although both groups suffered from sore foot and lameness in the stanchion barn, in most cases the condition was not apparent after the first few months, only a few cases persisting throughout lactation. Both groups suffered more attacks of mastitis while in the pen barn. Mastitis was prevalent in the herd during the experiment, however, and the more frequent occurrence of the disease in the pen barn is not believed to have been the result of any condition there.

The results of the experiment at the Huntley station indicate that cows will produce more milk and butter fat when they are permitted to run loose in a lounging or pen barn than when they are confined in stanchions. The difference in production apparently will depend somewhat on the level of feeding. The greater freedom and comfort of the cows in the pen barn at Huntley, as compared with that of the cows confined in stanchions and on hard floors, probably accounted for the higher production in the pen barn.

There are other points than the comfort of the cows, however,

that should be considered in deciding which system to use. In colder climates lounging barns require 15 to 25 pounds of bedding per cow per day as compared with eight to 12 pounds for stall barns. Where there is a lack of straw or other suitable bedding material, stall barns are used almost exclusively. In some areas, milk-market regulations oppose the use of the lounging or pen barn system because manure is not removed daily.

With both systems provision must be made for storing feed and bedding and for accommodating calves, heifers, dry cows, calving cows, and usually a bull. A milk house must also be provided if more than a few cows are kept and it should be close to the milking stable, preferably attached to the stable if regulations permit, but not opening into it. In cold climates, when all costs are considered, there is probably little difference in the total cost of the buildings required by the two systems or in the total cost of labor.

Where the weather is mild or dry, little shelter is required for dairy cows and only small quantities of feed and bedding need be stored. Under such conditions the milking room and lounging barn combination has an advantage both from the standpoint of cost and adaptability to changes in the size of the herd.

Spray Stumps At Any Time

Condensed from Cappers Farmer

Two recent discoveries will make brush control easier. The first is that stumps can be sprayed with 2,4-D any time of year to stop sprouting. The other is that 2,4,5-T (2,4,5-trichlorophenoxyacetic acid) will kill some woody plants that resist 2,4-D.

Both developments are announced by Keith C. Barrons and L. L. Coulter, of The Dow Chemical Company. Treating stumps is cheaper and more effective than applying 2,4-D to the green growth. But up to now it was thought spraying had to be done during warm weather and the growing season.

Barrons and Coulter stopped regrowth from stumps by using an ester of 2,4-D in fall, winter or spring. Part of their spraying was done when temperatures were close to zero. They say some

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sprouting will occur from root-suckering brush, such as sassafras and certain oaks, but even so total regrowth may be reduced 75 per cent.

They used the company's Esteron 44, which contains 44 per cent isopropyl ester of 2,4-D. For plants easily killed, 1 per cent of this material in fuel oil or kerosene was enough, but since some plants are more resistant, they recommend 2 per cent for general use. In some cases 5 per cent may be needed. They applied the mixture with a knapsack sprayer and a fan-type nozzle with medium opening such as is used for weeds. High pressures are not needed, but thoro wetting is.

This dormant-season spraying will help in brush control in 2 ways. First the spraying can be done with the clearing, whether in winter or summer. Most farmers will prefer winter when they have more time. One man with a knapsack sprayer can keep up with a sizable clearing crew. He wets each stump, top and bark, down to the ground. Cutting should be as low as practicable because the chemical is less effective the farther it must travel thru wood.

The other way in which this dormant treatment will help is that it permits combining mechanical and chemical control.

Treating dense or tall stands of brush with 2,4-D has been expensive and sometimes not effective. Heavy growth requires large quantities of chemical and resists penetration of the spray. So most farmers have preferred to use portable saws. Still they had the regrowth problem. Now they can follow sawing with spraying at minor cost and stop the sprouts.

Highway departments, drainage and irrigation districts, railroads, and power companies will find the winter application useful. They must guard against drift which would damage growing crops. By using the dormant-season spray they can avoid that danger.

Barron and Coulter used the winter treatment successfully on elm, sumac, black locust, wild cherry, hawthorne, sassafras, choke cherry, dogwood, elderberry and willow. They think any species susceptible to the chemical can be treated in the dormant season.

The 2,4-5-T is recommended as a foliage spray for plants that are too tough for 2,4-D, such as Osage orange and wild blackberry. This product is available in limited quantities as Esteron 245. Where 2,4-D-resistant brush appears along with nonresistant, 2,4-D and 2,4,5-T can be combined, 1 per cent each, with 98 per cent oil.

But for use during the growing season and as a foliage spray, they should be mixed with water, according to label directions, rather than oil.

Modern Swine Feeding Pays

Condensed from New Jersey Farm and Garden

George Van Der Noot

In the last decade or more the feeding of hogs has become more complex, and is no longer the relatively simple job of using one or two feeds to finish out a hog for market. This latter procedure was easier, even at the expense of taking a longer period of time and more feed to produce 100 pounds of finished pork.

It is an established fact, however, that under the old system it required 12 bushels of corn, when fed alone, to produce 100 pounds of pork, or 24 bushels for a finished market hog from weanling age. At present-day market prices of approximately $2 per bushel for corn, each finished market hog of 200 to 225 pounds in weight would cost a minimum of $48 to produce. Naturally, this does not include such costs as maintenance of the sow, labor, and other expenses that should be charged to each finished porker going to market.

Modern research in nutrition has reduced this cost by the use of high protein feeds fed in combination with corn. With the proper kind of protein supplement it requires only 11 bushels of corn, plus 100 pounds of supplement, to produce a hog to finish market weight. With the same price for corn per bushel and $7 a hundredweight for supplement, the cost of of a 200-pound finished market hog is $29—or a saving of $19 in feed cost for each fattened hog.

Corn is the popular basic feed for swine, but its shortcomings must be recognized. It is not only deficient in its quantity and quality of protein, but also in minerals and vitamins. A hog, being an animal with a relatively simple stomach, has a definite requirement of protein, minerals, and vitamins which corn alone is incapable of supplying. Therefore, a high quality protein which supplies the right kinds of amino acids in sufficient amounts must be supplied through a supplementary feed.

Research workers with hogs have found that the best results are obtained with an animal protein, such as meat scraps, tankage or fish meal as either all or part of the supplementary ration. Vegetable supplementary feed, such as soybean meal or linseed meal, fed alone with corn do not give

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as efficient results as when fed with any of the above-mentioned animal feeds.

Swine require additional minerals in their feed. Those which are usually lacking are calcium and salt. Corn, like most feeds of plant origin, is low or lacking in these two important minerals, which should be supplied by other substances. Ground limestone fed at the rate of 1% of the ration will furnish sufficient calcium, while common salt at the same level will supply the sodium and chloride essential to good pig nutrition.

Young suckling pigs which are being raised on concrete drylots are subject to anemia. Iron and copper are the minerals lacking in their diet. The painting of the sow's udder with a 5% solution of iron sulfate (copperas) will help prevent this problem.

In more recent years vitamins in the diets of swine have proven to be essential. Vitamin A and D are lacking in most cereal grains and protein supplements. Of course, if the swine are kept on pasture the A vitamin is taken care of through the green grass they consume. In a drylot feeding, alfalfa meal fed at a level of at least 8% of the total ration fed will supply the necessary requirement of this vitamin.

The D vitamin is supplied by direct sunlight, but can be added to the ration in the form of cod liver oil when the pigs do not have access to the sun rays. The D vitamin obtained by either method will prevent rickets. Still more recently the B-vitamins have been found essential in swine rations. Research workers are recommending that this complex vitamin be put into the rations to prevent dietary problems and improve the health of the animal.

The above points have been emphasized to show that the feeding of swine has become complex, as compared to the old swill barrel familiar to many. Regardless of whether the pigs raised are for home consumption or commercially, good feeding practices must be followed to receive the greatest return per pig.

It is important to make your ration fit the general conditions under which you raise swine. Drylot feeding of fattening hogs requires at least a 20% protein ration for pigs from weaning to 75 pounds in weight, and 16% thereafter. On a good legume pasture these protein percentages can be reduced at least 2% in each group.

Sows during the gestation and lactation period in drylot require approximately 10% of alfalfa meal in the ration, with a total protein content of 14% in the feed. If on pasture during these periods the alfalfa may be omitted.

Whenever possible pastures should be used as part of the diet for swine of all ages. Swine re-

spond best on legume pasture, but non-legumes, cereal grasses, and rape are all edible to swine. Pastures not only help keep down disease problems, but save 10 to 15% of the concentrates and approximately 50% of the protein necessary to finish a hog for market.

There is no meat animal that will give a greater return, with as small amount of feed, in as short a time as a hog. Feeding a hog may appear to be complex, as compared to the days when corn was used alone. However, those who are willing to face these complexities obtain a greater return in a shorter period of time, with the least possible amount of feed.

Feed Those Cobs!

Condensed from the Nebraska Farmer

Carl Deitemeyer

THE lowly corn cob is coming up in the world. It's acquiring economic dignity at Coon Rapids, Iowa, almost in the heart of the Corn Belt.

For several years Roswell Garst, Pioneer hybrid seed corn producer and farmer, has been feeding ground corncobs to beef cattle and getting gains as high as one pound and three-quarters per head a day. His results have been so surprisingly good that experts all over the country are watching the tests.

Garst has carefully followed the cob feeding work at the Ohio Agriculture Experiment Station. The animal husbandry department there has concluded after six years of carefully controlled experiments that ground corncobs have a feeding value more than half as great, pound for pound, as ground shelled corn when properly fed, with an adequate amount of proteins.

"Those studies were fine and dandy," says Garst, "but we wanted to know what cattle would do if fed more than one-third cobs and two-thirds corn—that is, 28 pounds of cobs per 56 pounds of shelled corn, with a suitable supplement. And since we have so many cobs in our business as a by-product, we want to use as many as we possibly can."

Nineteen head in one lot on Garst's farm are currently gain-

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July 17, 1948

ing at the rate of 1¾ pounds a day at an average feed cost per head per day of 28 cents. Mr. Garst will market this lot after 120 days without ever giving them a kernel of corn.

Here is the daily ration for the 19 head:

50 pounds of soybean meal and linseed meal mixed half and half—that is, 25 lbs. of each;

50 pounds of molasses to which urea has been added; (Actually, it is 45 pounds of molasses and 5 pounds of urea.)

50 pounds of bright baled alfalfa; and

300 pounds of ground corncobs.

The feeding method is simple and can be followed by any farmer, says Mr. Garst.

The dry corncobs are put through a hammermill with a one-half inch screen. The ground corncobs and the dry soybean oil meal and linseed meal are simply placed in the feed bunk. Then the 50 pounds of molasses and urea are diluted with about an equal amount—50 pounds—of water to remove the stickiness. The resulting thin syrup is poured on the feed in the bunk and stirred around with a hoe. The cattle receive this concoction only once a day. It is fed in the morning. Cattle have access to salt, too.

In the evening the cattle are given 50 pounds of good, bright, alfalfa hay. The hay is placed in the feed bunk on top of the remaining cobs. If the bunk is cleaned-up by morning a few extra cobs are added. If some remain, the number of cobs are reduced. All other feed is held constant.

Urea is a synthetic protein, and is only suitable for feeding ruminants as cattle, sheep, and goats. It carries an equivalent of 262 percent protein, and is only suitable for use up to one-third of the total protein intake. Mr. Garst adds that it must not constitute more than 1 1/10 percent of the total dry matter intake of the animals.

In this ration urea is extremely economical. Four ounces of urea contain approximately the same amount of protein equivalent as 1½ pounds of soybean oil meal. Four ounces of urea cost approximately one cent.

Mr. Garst points out that the use of urea and molasses and urea are in no way essential to the feeding of cobs. The Ohio Experiment Station has never used either urea or molasses in their extensive feeding trials.

Garst says a feeder can substitute two pounds of ground shelled corn for the molasses, feed two pounds of bright leafy alfalfa, three or four pounds of oilmeal mixture and all the ground cobs the cattle will eat.

The present lot of 19 head is small compared to the 550 head of 800-lb. steers that Garst and

his business partner Charles Thomas fed last fall and winter which made an average daily gain of 1.35 pounds under adverse weather conditions.

These cattle were bought in early November and placed on bluegrass pasture during November and December. Christmas week they were put into the feedlot. They were immediately placed on this daily ration per head:

Three pounds of soybean oil meal; two pounds of blackstrap molasses; four ounces of urea; and 20 pounds of ground corncobs, plus 50 pounds of ground limestone each day to the 550 head.

Garst emphasizes that this lot of cattle received no hay, no corn, no bedding and no shelter. And during the month of March they were belly-deep in mud. At the end of the feeding period, he says they looked fat enough to have eaten all the corn they wanted for 70–75 days.

The cost per pound of gain on these animals was approximately 22 cents.

Garst figures that cobs are worth approximately two-thirds as much as shelled corn, pound for pound, if properly fed. He figures cobs worth $25 a ton when corn is $1.25 a bushel.

Based upon work at the University of Wisconsin and Ohio State University Garst says there are three factors of primary importance in the feeding of corncobs:

"First: Cobs are low in vitamin A. For that reason the farmer should feed several pounds of bright hay per day to take care of the vitamin deficiency of cobs.

"Second: Cobs are low in protein. It is therefore desirable to stimulate bacterial action in the rumin, by excessive protein, such as soybean oil meal, linseed oil meal, or cottoncake.

"Third: Since corn will increase the rate of gain on cattle and farmers have corn available, it is suggested that some corn be fed—as little as four pounds per head per day at the start of the feeding period."

In feeding 400-pound calves, Garst recommends cutting the amount of feed approximately in half, as a 400-pound calf eats only about one-half as much as an 800-pound critter.

Trace Minerals For Proper Nutrition

Condensed from The Jersey Bulletin

T. Walter Hardy, Jr.

In recent years, more and more knowledge has become available concerning the cause, prevention and treatment of nutritional diseases in dairy cattle. The intelligent application of this knowledge means higher, more profitable milk production for the dairyman. So, it is important that the dairyman learn how to avoid any deficiencies which may result in nutritional diseases, and recognize them when present in his herd.

The value of the two major minerals, calcium and phosphorus, is generally recognized. However, there are certain trace mineral elements which have been found necessary for the proper nutrition of dairy cattle—in certain definite but small (or trace) amounts. The five essential trace minerals are iodine, cobalt, manganese, copper and iron.

Of these essential trace minerals, iodine has been used over large areas of the country for years as an addition to dairy rations. It is essential in regulating the functions of the thyroid gland. A deficiency of iodine causes goiter in dairy cattle, with the result that calves may be born deformed or hairless. Although an iodine deficiency may not be apparent at first in mature cows, the addition of iodine is known to produce healthier calves, increase milk production and improve gains.

In a number of different areas in the United States—especially Florida and other southeastern seaboard states, and also Michigan, Wisconsin, and several New England states—there is a deficiency of cobalt. Such deficiency may result in loss of appetite, stunted growth and anemia. The feeding of cobalt to cattle showing such symptoms has shown favorable results. Normal appetites and increases in weight have been observed within a week.

Manganese is known to aid in the bone-, blood- and tissue-building processes of the cow. Although the symptoms of manganese deficiency are not as pronounced as in iodine or cobalt—tests show that dairy cattle have responded favorably to the addition of this trace mineral, which aids in growth and reproduction.

Deficiency of copper and iron is prevalent in the sandy soil of Flor-

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July 25, 1948

ida, but there may also be a lack of these trace minerals in scattered sections throughout the United States. Both copper and iron are needed to produce hemoglobin (red blood cells), which prevent anemia in cattle.

Studies are being made of trace mineral deficiencies in connection with Bang's disease. It is believed that there is a relationship between the lack of certain trace minerals in dairy rations and the presence of Bang's disease in cattle. Experiments conducted at several state universities have revealed that wherever Bang's disease was prevalent, there was a deficiency of manganese in feed crops. It is believed that copper, cobalt and manganese together play an important role in the prevention and correction of the disease.

Many dairymen may be unaware that their feed crops may not contain sufficient essential trace minerals. Poor quality or inadequate feed may lead to nutritional deficiencies and lowered resistance to disease. Crops may not necessarily be poor or failures to be deficient in certain trace minerals. The deficiency becomes evident after such crops are fed to the dairy herd. In some cases, unfavorable growing seasons—either too wet or too dry—may be the reason that one or more of the essential trace minerals are not absorbed by forage crops. Or, the soil may be depleted of certain trace minerals by short rotation of grain crops.

It is, therefore, the duty of nutrition authorities to prescribe the addition of essential trace minerals (cobalt, iodine, manganese, copper and iron) to dairy rations—in order that dairymen may furnish their herds with the correct balance of essential nutrients in necessary amounts.

The most practical method of distributing trace minerals is by use of a special carrier. As the one major mineral which is needed in all dairy rations—SALT is the logical and recommended carrier of the five trace minerals essential to the proper nutrition of dairy cattle. Inasmuch as the cost of this trace mineral salt is little more than the cost of ordinary iodized salt—it is cheap insurance against possible losses in production due to a deficiency of one or more of the trace minerals.

Trace mineral salt was developed with the aid of State Experiment Stations. Only those trace minerals which were definitely found to be lacking in the diet of one or more species of livestock were incorporated into the formula for trace mineral salt. No unnecessary or undesirable trace minerals were used; however, each ingredient which was added has a definite purpose.

These elements need to be fed

in only small amounts to be effective. And, if the ordinary feed rations for the dairy cow should already have enough of these trace minerals—additional amounts in salt will do no harm. By mixing trace mineral salt with ground limestone and bone meal—a complete, low-cost mineral supplement will be provided. If it is known that rations already contain enough legume roughage and oil meal, calcium and phosphorus —two major minerals—are probably adequate. If such is the case, trace mineral salt may be fed free choice. Trace mineral salt may also be used in place of ordinary salt when salting hay. This not only improves the condition of the hay, but makes the hay more appetizing to cattle.

Trace mineral salt is rapidly growing as an insurance measure against trace mineral deficiencies. Investment in trace mineral salt is the dairyman's assurance that his cattle are adequately supplied with all trace minerals known to be necessary—to promote the good health of his herd and to protect them from deficiency diseases.

Ohio's First Fly-Free County!

Condensed from The Ohio Farmer

AN ENTIRE county free of flies! Impossible? Well, the folks of Sandusky County don't think so. In fact, this county in the northern part of the state is already well on the way to becoming the first fly-free county in Ohio. They have put on an organized campaign to rid Sandusky County of flies! And that campaign is going over in a big way.

Flies have always been a summertime pest to farmers. They have worried the livestock. They have swarmed on the screen doors ready to zoom into the kitchen the first time the door was opened. And it has been around the dairy barns and milk houses that they have proved to be the greatest nuisance and menace. Who wants to drink a glass of milk if he knows that a fly has just ended his days floating on the top of the milk pail?

It's true that many farmers have waged a steady war on these insects, but it is only in recent years that they have seen much chance

Reprinted by permission from The Ohio Farmer, Cleveland, Ohio, July 3, 1948

of winning a permanent victory. Cleaning up manure piles and other breeding places helped a lot in keeping down the fly population. Screens kept some flies out of homes and milk rooms.

It was only with the development of DDT in the last few years that there was any way of killing flies in wholesale quantities and doing it with little trouble. A DDT spray, properly applied, kills the flies. It also lasts for a long time and means that one or more sprays will be enough to keep a farmstead free from flies during an entire season. It is against this kind of a background that the Sandusky County fly control program is being built.

Organizer of the county-wide fly control program was B. W. Reading, county agricultural agent. Starting the campaign last winter was a series of meetings to get people interested in stamping out flies. These meetings resulted in a county-wide organization with a chairman appointed to head the fly-control drive in each township and village in the county.

Following the meetings, County Agent Reading sent out letters telling about the troubles caused by flies and urging everyone to take part in the fly control plan. He suggested either spraying buildings, shrubbery and barnyard with DDT or hiring the work done on a custom basis.

It happens that custom fly spraying service is available in this county and it is probably due pretty much to this fact that the drive is going over so successfully. Most of the spraying is being done by the Commercial Chemical Company at Gibsonburg, operated by Fred Karlovetz. This company has seven spray outfits and is going up and down the roads spraying about 90 percent of the farmsteads as it goes.

Of course a farmer can do his own spraying if he has the equipment and cares to do so. But, in actual practice, most of them find out they can better afford to hire it done. Arthur Nuhfer explained the feeling of most farmers when he said: "We have used this custom spraying service for the past three years. Fly spraying is one of the things that probably just wouldn't get done if we had to do it. This outfit does a good job and the price is low enough so that we can't afford to fool with the job ourselves."

Karlovetz has built up the volume of his custom spray business by keeping the price at a level that almost any farmer could afford to pay. He says: I'm a farmer myself and know that you have to keep the price down if you want to get a large volume of business." History of this company to date indicates that he has been right in his thinking. In 1946 they sprayed about 500 farms in San-

dusky County. Last year the number jumped to about 2000 farms in Sandusky and the edges of surrounding counties. This year Karlovetz estimates that he will probably spray about 95 percent of all the farms in the county.

The rate for this spraying service varies from a low of $12 to a high of $25 with most farms costing $15 for a complete spraying. The spray is applied to all places where flies breed or are likely to gather. Such places include dairy barns, horse stables, chicken houses, manure piles, barnyard fences, foundations, porches, weeds, shrubbery and small buildings around the house.

One spraying usually gives good results for the entire summer, however, under some weather conditions it may be necessary to apply a second spray in August or September. Of course, in addition to getting rid of the flies, this treatment also eliminates mosquitoes as well.

Most farms in Sandusky county will be sprayed for fly control this summer but the program is by no means confined to the farms alone. Every small town in the county has already been organized. In fact, to Lindsey, in the northwestern part of the county, goes the distinction of being the first town in the county to be sprayed 100 percent. This town may be the first in Ohio to have every home sprayed.

Last year all but six homeowners in Lindsey used the fly treatment. This year all wanted the same service again, and in addition the other six families decided to join up. This means that here is a town where the goal of a fly-free community should be almost reached.

It takes some kind of an organization to get an entire town or village signed up for fly spraying. The Sandusky County plan has a chairman in each town who gets some local organization to canvass the town and sign up those who are interested in hiring the work on a custom basis.

The day of our visit to Sandusky County we found Mr. Karlovetz operating one of his sprayers in Woodville. The sprayer was mounted on a truck. The hose line was long enough to reach to the back of each lot. The truck stopped in front of each house listed for the service. The house, shrubbery, foundations, garage and other likely spots received the DDT spray.

Karlovetz points out that it is possible to keep the price of this custom work in towns at a low level only if most of the homes are to be sprayed. He says: "It's just got to be a lot more expensive if you only spray 50 homes in a town of 300 or 400."

This is the first year for spraying in Woodville and 250 homes

were being sprayed out of a total of 350 to 400 in the town. Even more might have been signed up if the drive had been started a little earlier.

Bob Rieman, member of the village council and chairman of the fly and pest control committee in Woodville, tells how the drive was organized there. He says: "I was asked to attend a meeting on fly control called by County Agent Reading. There the mayor of Lindsey spoke and was so enthusiastic about their fly control campaign that he sold me on the idea. I came back and asked our garden club to handle the drive in the town. One of the ladies in the garden club was from a farm where they had been hiring this fly spray service for the past couple of years. She was so pleased with the result that her testimony really convinced the others. They went out and in just a couple of weeks had 250 homes signed up."

In addition to these 250 homes, the city dump, park and other public property is also sprayed. To cover this property the village council appropriated $150 to pay for the work.

There's one other angle to this Sandusky County program. Not only is the county well started on this drive to become fly-free, but there is also a program to spray the roadsides of the county for weed control. One application of 2,4-D has already been made and one or possibly two additional applications will be made later in the season. This part of the program is being watched with keen interest by county and state highway workers who see in this development a chance to cut down weed control costs.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACTS OF CONGRESS OF AUG. 24, 1912, AND MARCH 3. 1933, AND JULY 2, 1946

of the Farmers Digest, published 11 issues a year at Ambler, Penna, for October 1, 1948
State of Pennsylvania
County of Montgomery

Before me, a Notary Public in and for the State and County aforesaid, personally appeared L. Bush-Brown, who being duly sworn according to law, deposes and says that he is the business manager of the Farmers Digest and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3 1933, and July 2, 1946 embodied in section 537, Postal Laws and Regulations, to wit: 1. That the names and addresses of the publisher, editor, managing editor and business manager are: Publisher. L Bush-Brown, Ambler, Pa.; editor, L Bush-Brown, Ambler, Pa.; assistant editor, C. Leavitt Dyer, New Hope, Pa.; business manager, A. E. Heick, Ambler, Pa. 3. That the known bondholders, mortgagees and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages or other securities are: none. Signed, L. Bush-Brown, Publisher.

Sworn to and subscribed before me this 7th day of October, 1948. (Seal). John Cassidy, Notary Public. [My commission expires January 7, 1951.]

Buying a Dairy Cow?

Often mistakes made in the purchasing of dairy cattle can be avoided if the buyer will pay attention to certain essential factors which determine the actual value of an animal. Here are a few points to think about when buying a dairy cow:

Age: A cow reaches her maximum production at about seven years of age. A three- or four-year-old is highly desirable. But many buyers prefer two-year old bred heifers close to freshening because they know such animals have not been culled as the result of poor yield, low fat test, or some other fault.

Soundness of udder, limbs, feet, teeth, breeding organs: A sound udder is absolutely necessary. Beware of "blind" quarters and lumps in udder. A cow with weak legs, poor feet, and defective teeth cannot stand the hard work required of an efficient milker. Breeding history measured by regularity of calving is an index of the animal's reproductive powers.

Health: Freedom from T.B., contagious abortion, and mastitis are absolute musts.

Immediate productiveness: How long since calving? Is animal bred? Is she an easy milker?

Producing ability: How much milk and fat were produced in previous lactation? Ascertain butterfat test from a representative sample of her milk and not from a single milking or even a single day's milking. Under what conditions were past records made?

Disposition: Kickers, fence jumpers and extremely nervous animals are difficult to manage. Beware of them.

Where purebreds are involved additional consideration should be given to: pedigree, type, and quality of service sire.

Adherence to all of these considerations may be impossible but attention to any one of them may help in building a more profitable herd. Always try to buy a cow subject to the guarantee that she is sound in every way and a good producer.

—By E. J. Perry
N. J. Farm and Garden

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"The American Constitution is but the roof and walls of a faith which dwells within. Our cities and towns that stand gloriously against the sky, and seem so strong and durable, are blown into these shapes by the spirit which inhabits them and will subside again when the spirit is withdrawn. As long as the people keep their faith, that faith will keep the nation . . . May God inspire in the hearts of all of us the secret singing of the faithful."

—Maxwell Anderson